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SPECIAL ISSUE ON DECISION MAKING

Studies and Theories of Decision Making
Martin Shubik

The Role of Expectations in Business Decision Making
R. M. Cyert, W. R. Dill, and *J. G. March*

The United States Decision to Resist Aggression in Korea
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Individual Decisions to Undertake Psychotherapy
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Operations Research and Managerial Decision Making
Burton V. Dean

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Martin Shubik

Studies and Theories of Decision Making

As the first of several articles dealing with different techniques applied to the study of decision making in various disciplines, this article outlines the scope of current decision-making analyses; the complimentarities that exist among the different approaches; and the conclusions drawn by each approach. The author also reports on one aspect of work on decision making which has developed from consideration of economic theories of the behavior of the firm. Finally, some tentative generalizations about the method and substance of decision making are set down, as suggested by the five articles in this issue.

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DURING the past few years there has been an explosion in the amount of work done in the social sciences. With it have come an increasing degree of specialization and an increasing recognition of the need for interdisciplinary co-operation. As a result, disciplines with new names and new vocabularies have developed whose categories seem to fall between the customary categories of the other disciplines.

There are many who feel that disciplines such as administrative

[1]I am deeply grateful to my colleague, Dr. Donald Heany, for valuable comments and criticisms.

science, management science, operations research, team theory, organization theory, and so forth are only temporary fads that will either disappear completely or be absorbed into one of the more traditional disciplines. The jurisdictional disputes will probably continue, but we do not propose to enter further into them here.[2] Regardless of how they are resolved, the recognition of a close community of interest in certain problems by investigators in many disciplines is an important fact today. One of the subjects of common interest is that of decision making.

The economist immediately thinks of economic choice. The political scientist may wish to investigate the mechanism of choice in a voting system;[3] the selection of a strategy in international affairs;[4] or if he is interested in administration or economics he may study the mechanisms of decision making in local government or in the framing of laws governing the regulation of trade.[5]

The psychiatrists will challenge the concepts of decision that are considered important by those in other disciplines. Their models of man, from which they construct their theories, utilize different concepts. The psychiatrist's problem of defining conscious or unconscious decisions hardly occurs to the economist, whose rational man, even though he has been badly mauled by half a generation of behavioral scientists, still functions more or less on the conscious level.

The psychologists enter with considerations of threshold levels that limit the sensitivity of response to various stimuli. Some of these responses, such as jumping off a very hot radiator, may not require a conscious decision; others, such as the opening of a window in a room which has gradually become too warm, may involve a conscious decision. In the latter example a problem exists as to how to describe when and under what circumstances the individual will begin to think consciously about opening the

[2]For a discussion of the growth of a new discipline, see K. Boulding, Evidences for an Administrative Science, *Administrative Science Quarterly*, 3 (1958), 1–22.

[3]Bernard R. Berelson, Paul F. Lazarsfeld, and William N. McPhee, *Voting* (Chicago, 1954).

[4]Richard C. Snyder, H. W. Bruck, and Burton Spain, *Decision-making as an Approach to the Study of International Politics* (Princeton, N.J., 1954).

[5]Hans B. Thorelli, *The Federal Antitrust Policy: Origination of an American Tradition* (Baltimore, Md., 1955).

window. Other psychologists have investigated decisions to select alternatives from a set of choices by subjects faced with varying forms of uncertainty. Learning behavior has been observed in controlled experiments, and several theories of this behavior exist.[6]

The psychologist and sociologist overlap in their interest in small-group behavior.[7] Joint decision making in a small group allows the study of problems of personality interaction and social structure in a laboratory-sized situation. For this reason much experimental work has been done on such problems.

The interplay of the different approaches to decision making has been explicitly recognized in the growing literature of the new or "in-between" disciplines.[8] There is an increasing realization that the study of decision making includes individuals in as diverse fields as sociology, neurology, servomechanism engineering, and advanced design for computers. In the past few years serious investigation of "thinking" machines has taken place. Researchers have begun to examine ways to build machines which prove theorems. Attempts have been made to simulate intelligence.[9] At the Bell Telephone Laboratories, Claude Shannon has constructed "mice" which solve mazes and learn how to get through them faster and faster on succeeding trials. Built into them is a decision mechanism which tells them how to choose between alternatives.

Not only have there been considerable overlapping and coming together in the behavioral sciences in the study of decision making, but the relationship between these studies and the work of mathematicians and statisticians has changed greatly in the past two decades. Since 1940 new techniques and methods of mathematics designed especially for behavioral science problems, or at least

[6]R. R. Bush and F. Mosteller, A Mathematical Model for Simple Learning, *Psychol. Rev.*, 58 (1951), 313–323; W. K. Estes, Toward a Statistical Theory of Learning, *Psychol. Rev.*, 57 (1950), 94–107.

[7]Paul J. Hoffman, Leon Festinger, and Douglas H. Lawrence, "Tendencies toward Group Comparability in Competitive Bargaining," in R. M. Thrall, *et al.*, eds., *Decision Processes* (New York, 1954), ch. xvi.

[8]See, for instance, Herbert A. Simon, *Administrative Behavior* (2nd ed.; New York, 1958).

[9]M. L. Minsky, *Heuristic Aspects of the Artificial Intelligence Problem* (Massachusetts Institute of Technology, Lincoln Laboratory, Group Report 34–35, Dec. 17, 1956).

adaptable to them, have come into existence. Possibly the two most striking have been the statistical decision theory of Wald[10] and the theory of games of von Neumann and Morgenstern.[11] Recently much work has been done on theories of communication and information.[12] Although these have initially been of interest to the communication engineer, they are being used increasingly in the study of communication systems in organizations.

All of the topics noted, though highly different in content, have as a common core the investigation of the processes of communication, information, and decision.

ECONOMIC MAN, SOME DESCENDANTS AND MATHEMATICAL COUSINS

In this section the scope is narrowed to include only an examination of decision models prevalent in writings on economic theory. It is always easy to set up straw men so that they may be torn down. The model of *Homo oeconomicus,* which has served the economists rather well for many years, has recently been used as a straw man. He is presented as a rational, omniscient, lightning-quick calculator who chooses among well-defined alternatives (possibly billions of them) in such a manner that he maximizes his utility if he is a consumer, or his profit if he is an entrepreneur.

Moral philosophers such as Adam Smith were well aware of economic man's other roles. In his writings Alfred Marshall also stressed the social aspects of economic man.[13] Nevertheless, the textbooks, when teaching the theory of consumer choice or the theory of price (at least in competitive markets),[14] use models which imply the omniscient rational man.

For example, consider the theory of consumer choice in which a consumer with a fixed amount of one resource can exchange at a given rate for another resource. An indifference map can be drawn to show the preference pattern of the consumer. In Figure 1 the fact that the pairs of quantities (x_1,x_2) and (x_1^1, x_2^1) lie on the same

[10]A Wald, *Statistical Decision Functions* (New York, 1950).

[11]J. von Neumann and O. Morgenstern, *Theory of Games and Economic Behavior* (3rd ed.; Princeton, N.J., 1953).

[12]See Colin Cherry, *On Human Communication* (New York, 1957).

[13]A Marshall, *Principles of Economics* (8th ed.; London, 1922).

[14]See, for instance, G. J. Stigler, *Theory of Price* (New York, 1946).

curve implies that the individual has no reason to prefer one pair over the other. If the consumer starts with an amount M of Com-

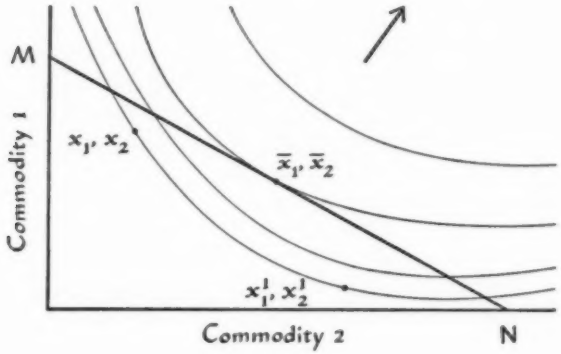

Figure 1.

modity 1 and is confronted with a fixed rate of exchange of M units of Commodity 1 for N units of Commodity 2, he is in a position to effect any combination that lies on the line MN. On the assumption that, all other things being equal, more of a commodity is preferred to less, the indifference curves in the further northeast direction are preferred to those which are closer to the origin. Given that the consumer wishes to maximize his utility, he will choose the combination $(\bar{x}_1,\bar{x}_2)$.

Does the consumer act as if he possesses such an indifference map? Can his behavior be best explained by the assumption that he is in a position to examine myriads of possible states and select the maximal one? Even if he were able to consider many alternatives, are his perceptions sufficiently good to enable him to evaluate small differences? A recent study has shown that the average consumer purchases the second or third house he examines. Yet this is one of his most important decisions *qua* consumer. A relatively insensitive consumer examining two or three alternatives prior to acting appears to be a far cry from *Homo oeconomicus*. Leaving him, we turn to the producer.

The theory of the behavior of a firm in a purely competitive market can easily be demonstrated mathematically. Let us call the

net revenue function R. As it is a function of the output q, we write it as $R(q)$. Call the total cost function $C(q)$. We may then express the revenue function as:

$$R(q) = pq - C(q).$$

The theory of economic choice calls for the entrepreneur to select a q which maximizes $R(q)$. Calculus tells us that this is obtained by setting the first derivative of $R(q)$ equal to zero and solving the resultant equation for q.[15] This leads to the expression

$$p = \frac{dC(q)}{dq},$$

which states that the marginal cost of production equals price p.

How well does this model fit what little we know about the firm and its behavior? In general, the empirical work that has been done indicates that firms do not know very much about the shapes of their cost and revenue functions. Firms which are more advanced and which have carried out investigations usually arrive at linear approximations for costs over various ranges of production. Good linear approximations for a cost function are difficult enough to obtain. In many industries, to obtain more appears to be prohibitively expensive. Among small firms run by individual operator owners the state of ignorance concerning costs and the methods of operation is even greater. The few empirical studies of business failures show a large death rate among firms requiring low capitalization.[16] It appears that much of the mortality is due to ignorance of costs and/or methods of business.

It follows, therefore, that our economic man must at best act in partial ignorance of the costs of operation of his own business. Unfortunately he has still worse problems to face if he is not the sole owner entrepreneur in a business. As a member of a firm, his goals will be considerably modified by many considerations that must be faced by the corporation. This is especially true if it is large with many stockholders and is run by a managerial group that has little equity in the company.

[15] We assume that $C(q)$ is twice differentiable and $\frac{d^2R}{dq^2} < 0$.

[16] A. R. Hutchinson and M. Newcomer, A Study in Business Mortality, *American Economic Review*, 28 (1958), 497–514.

In the corporation consideration is given to employee and stockholder satisfaction, to public relations, and to the self-image, such as a producer of "the most dependable product of its type," a leader in innovation, and so forth. The economist can, without too much trouble but with a certain loss of precision, enlarge or modify his theory of the firm to account for these subordinate goals. The goal of the corporation may then be described in terms of modifications of a maximization principle. Long-term expected profit is to be maximized subject to conditions such as the risk of bankruptcy,[17] the level of dividends, the stability of employment, and so forth. Does this patchwork yield a useful theory which offers better explanations and predictions of phenomena than alternative theories? This is an open question to which many would hazard the answer, no.

Suppose that we could usefully modify a theory so as to allow economic man to make his conscious choices, subject to the various limitations resulting from being a member of a corporate entity. There are still problems to be solved before we have a well-defined model of his decision processes. If his firm does not have hundreds of competitors of like size, the market place may be far from purely competitive. It will be necessary for him to consider the influence of the actions of other sellers.

Economists have long recognized the difficulties inherent in trying to devise theories of behavior where sellers are few. The theory of games[18] has addressed itself to the study of situations in which the reactions of competitors must be taken into account. For a narrow set of games, those which are described as two-person, constant-sum games (constant-sum because, whatever the outcome, the sum of the winnings of one player and the losses of the other is constant), a behavior is prescribed by the theory. Economic man is joined by the minimax man who exhibits "rational" behavior in such situations. This minimax behavior is not necessarily observed when psychological experiments utilizing laboratory setups which are equivalent to a two-person, constant-sum game are

[17]See, for instance, M. Shubik, *Strategy and Market Structure* (New York, in press).

[18]For a comprehensive exposition of the theory of games, see R. Luce and Duncan and Howard Raiffa, *Games and Decisions: Introduction and Critical Survey* (New York, 1957).

performed. Estes has indicated that the behavior of the subjects in his experiments conformed to learning-theory predictions rather than game-theory predictions.[19]

Most economic situations do not lend themselves to being described like a two-person, constant-sum game. For all games of three or more players and for non-constant-sum games with two players there are many theories of solution. Each theory amounts to a description of the decision behavior of each individual in this interdependent state. Von Neumann and Morgenstern suggest that all competitors will act jointly so as to maximize their joint gain from their environment and will then work out an elaborate scheme for the division of the proceeds.[20] This appears to happen but rarely. Their solution depends upon the assumption that all competitors are completely informed about their environment. In general this is not a good approximate description of reality. Nash has suggested a behavior pattern which results in the establishment of equilibria,[21] which he suggests should be regarded as the solution to an *n*-person game. Flood has run some experimental games to test whether such a theory would predict the outcomes.[22] The actual results correlated well with the results predicted by the theory.

For the moment we disregard the businessman's extra problem, that of accounting for the moves of competitors. Suppose, as is often the case, that he lacks information concerning his environment, but has some knowledge of the cost of obtaining more information. A simple example is provided by a standard quality-control sampling problem. If a manufacturer sells bullets and guarantees that no more than a certain number will fail to fire, how many bullets should he test prior to sending out the shipment? The answer depends upon the cost of failing to meet the guarantee, the cost of testing a bullet, and the assumption concerning the nature of distribution of possible errors. The developments in the theory of sequential testing have led to suggested rules of behavior. Sequen-

[19]W. K. Estes, "Individual Behavior in Uncertain Situations: An Interpretation in Terms of Statistical Association Theory," in Thrall, *et al.*, eds., *op. cit.*

[20]Von Neumann and Morgenstern, *op. cit.*

[21]J. F. Nash, Non-cooperative Games, *Annals of Mathematics*, 54 (Sept. 1951), 287.

[22]Merrill M. Flood, "On Game-learning Theory and Some Decision-making Experiments," in Thrall, *et al.*, eds., *op. cit.*

tial decision-making man is a close relative to minimax man as he tries to ensure against the unknown aspects of his environment. The success of sequential testing methods in many industrial processes indicates that in some situations businessmen have learned to act in this manner to their profit.

To deal with more poorly structured situations of uncertainty, theories of "games against nature" have been constructed. Leonard Savage suggests that rational man should "minimize regret."[23]

All of the theories noted above leave the student of the theory of the firm with the realization that no completely satisfactory theory exists to account for decision making under uncertainty due to either lack of knowledge about the environment or the presence of competitors whose actions must be taken into account. In summary, the basis of the concepts of economic man and his near relatives are the following:

1. A decision is a (conscious) choice of a move (or action) from among a well-defined set of alternatives.
2. The individual decision maker can attach a value to the outcomes arising from any set of moves.
3. The individual decision maker is motivated to act in such a manner that the expected value to him of the outcome is as high as possible.

Even casual empiricism indicates that the second assumption does not mirror adequately the world about us and that the third is hard to define rigorously and difficult to test. Once we rid ourselves of theories based on economic man and his relations, do we have better alternative theories?

In the literature of economics there are many descriptions of behavior such as "price leadership."[24] To a limited extent some of these descriptions have provided a tentative basis for theorizing about price formulation in certain types of markets. In general, however, the gap between theory and empirical studies is large, and little in the way of testable alternative theories has been offered.

Simon has suggested a "satisficing man" to replace economic

[23] *The Foundations of Statistics* (New York, 1954), p. 30.

[24] See, for instance, William Fellner, *Competition among the Few* (New York, 1949), pp. 51, 53, 169–174.

man.[25] "Satisficing man" is at home in a bureaucracy. Such a man is more concerned with checking to see if a program is feasible and yields "enough" rather than to see if it is maximal. He is very much a sociopsychological creature–so much so that this writer finds Simon's man disturbingly unmeasurable, hard to define, and difficult to work with. Yet Simon's discussion of administrative behavior makes a persuasive case for consideration of man as a creature of routine, operating under conditions of incomplete information concerning both the environment and his own goals.[26]

Boulding has suggested that "heroic man" dominates economic man. His is the ethic which calls for action without calculation of cost; he is the motivator of saints and soldiers. Boulding states that "without the heroic, man has no meaning." He adds: "Without the economic, he has no sense."[27] This distinction is also attractive. Possibly it is heroic rather than economic man who starts price wars.

The models of economic man and his mathematical relations are for the most part inadequate for the construction of verifiable theories of behavior of individuals within the firm. Predictions concerning price formation, market structure, and other more or less microeconomic features of the economy have not been very successfully based on the models of economic man. We still await an extensive body of tested theory based upon these or other assumptions.

One of the major blocks impeding the growth and testing of theories of microeconomic behavior has been the lack of knowledge of the average economic theorist about the firm and its decision processes. During the past two decades several developments have taken place which appear to be removing this block. The growth of operations research and management science has considerably increased the contact between academicians and firms. Industry and private foundations are supporting or inviting research upon their organizational decision processes in a manner undreamed of twenty years ago.

[25]Herbert A. Simon, *Models of Man* (New York, 1957).

[26]See, for instance, *Administrative Behavior*.

[27]K. E. Boulding, *The Skills of the Economist* (Cleveland, 1958).

TOWARDS A THEORY OF THE FIRM

In this section, some recent advances in the study of the firm are discussed, and a suggestion is made for a method of investigation to be followed. Most of the theories concerning competition in markets not composed solely of many small competitors have solutions which are indeterminate: the theories do not offer predictions of the outcome in the market but merely delimit a range of possible outcomes.

The ranges depend upon the variables selected as independent and important. Considerable attention has been paid to models in which either price or production are the dominant variables. These are the traditional economic variables. In the 1930s and subsequently various writers suggested that these were insufficient to explain the phenomena of the markets and their formation.[28] Product differentiation by means of styling, different types of service, and advertising were considered explicitly. The list has recently grown much longer until today among those features of the decision processes of the firm are: price, advertising, inventory policy, production scheduling, product variation and styling, investment, research and innovation, and distribution. The list is by no means complete and in many instances the categories overlap. Furthermore, most of the decision areas are restrained by the manner in which possibly the most crucial decision is made—the internal allocation of funds. This appears to depend heavily upon the institutional aspects of the firm, that is, its size, legal form, and organizational structure.

At best, if we still wish to consider the decisions of the firm as the results of conscious, more or less economic action, we must note that many of the major decisions are small-group or team decisions. Executive committees, management councils, and boards for the most part decide upon the major policies, such as internal allocation of funds. Where decisions are delegated, the individuals who take the final action may be forced to act in ignorance of each other, though making decisions that are highly interdependent.[29]

[28]See, for instance, Edward H. Chamberlain, *The Theory of Monopolistic Competition* (6th ed.; Cambridge, Mass., 1950).

[29]J. Marschak and R. Radner, The Firm as a Team, *Econometrica*, 22 (Oct. 1954);

It is quite possible that what appears to be rational action on the part of several individuals in an organization may result in a disastrous joint effect. One of the major problems in the design of organizations with decentralized decision making is avoiding this.

How determinate and how valid a theory of the firm can be based upon consideration of the decision areas noted, together with an explicit accounting for organization structure, remains to be seen. By adding successively more and more sophisticated systems of epicycles, the Ptolemaic theory of astronomy was able to account for more and more facts until a new, simpler theory swept it away. Perhaps the same fate will befall theories based on economic man, even though they are patched up to account for a few more facts.

We have previously noted that much of economic theory on the behavior of the firm leads to solutions which are indeterminate. We further suggested that enlargement of the number of variables to be taken into account may cut down the areas of indeterminacy in the solutions. Another highly important feature to consider is the role of time. There are few fully dynamic theories of the firm. Discussions which consider the actions and reactions of competitors certainly exist. Financial experts are highly conscious of the importance of different mobilities of different assets, yet to date our knowledge of the effect of time lags in microeconomic systems and organizations is limited.

There are many trade-cycle models based on the presence of lags in the economic system.[30] Recently the literature on inventory theory has illustrated the effect of some of these lags.[31] In operations research work queuing problems are encountered. These, too, indicate the importance of time lags.[32] From the mathematics of difference, differential, and integral equations, we know that on occasion the effect of apparently insignificant terms may easily grow and finally dominate the solution of an equation. Identifying

J. Marschak, Elements for a Theory of Teams, *Management Science*, 1 (Jan. 1955); also a forthcoming book on the theory of teams.

[30]See, for example, Gottfried Haberler, *Prosperity and Depression* (3rd ed.; Geneva, 1941).

[31]K. J. Arrow, S. Karlin, and H. Scarf, *Studies in the Mathematical Theory of Inventory and Production* (Stanford, 1958).

[32]Philip M. Morse, *Queues, Inventories and Maintenance* (New York, 1958).

which lags in an economic system may have this property is a difficult empirical problem.

Investigation of the state of the theory of the firm leads us to the conclusion that properties of systems with many economic variables and explicit time lags need to be examined. From the construction of complex models based upon the study of the fine structure of individual firms and their environment, we may be able to generate hypotheses concerning decision-making behavior which eventually can be tested.

The two major barriers to the construction and manipulation of complex economic models are substantive and methodological. The first is the sheer size of the task of obtaining detailed information to give specificity to the model. The second concerns our ability to manipulate complex systems. In general we find that it is easy to construct models which do not satisfy us because they represent too gross an oversimplification of the system we are observing. Yet the same models may be far too complex to analyze mathematically.

Little more than the most obvious comments can be made about the first barrier. However, the growth in the technology of computing machines has made a considerable difference in our ability to cope with the second. The basic hypothesis advanced here, and as yet not fully tested, is that the technique of computer simulation can be used to test successfully many of our theories concerning the decision-making behavior of the firm.

SIMULATION: A MICROSCOPE FOR THE STUDY OF ORGANIZATIONS?

In this section and the next we discuss the reasons for choosing a simulation and some of the tentative conclusions which can be drawn from the investigations necessary to the formulation of the initial models of parts of the firm and its environment.

A computer simulation of an organization is achieved by constructing a mathematical model of the organization, coding the model for machine manipulation, and having the computer produce a "run" of future states of the system subject to the conditions expected to prevail in the environment.

A simulation of the actions of an economic man confronted with

the choice of a one-dollar or a five-dollar bill at every time period can easily be carried out. The behavior function used to describe his action when faced with a set of n alternatives S where s_i is the i^{th} alternative with value $v(s_i)$ is: Select s_i such that it is the maximum element of $(v(s_1),v(s_2),v(s_3),\cdots,v(s_n))$. This model can obviously be easily manipulated mathematically without a computer. The hypothesis that at least 99 per cent of the population will select the five-dollar bill 99 per cent of the time or more can be tested with little experimental trouble.

A simulation of the actions of men in firms in market environments is somewhat more difficult to construct. The identification of parameters and variables followed by the construction of behavior functions to describe their manner of choice presents a considerable task. Nevertheless, the principle in both cases is the same. If the functional forms and parameters are specified, it is possible to examine the dynamics of large multivariate systems. We are provided with a tool to test our intuitions and to examine the consequences of behavioral assumptions after a complex series of actions has taken place.

The digital computer provides a quantitative means for obtaining, at first, qualitative results. The inaccuracy of our mathematical modeling is such that, although numerical information is printed out, our interpretation of numerical differences is only in terms of "markedly less than," "greater than," or "approximately the same as." By varying parameters and functional forms, the intent is to explore for sensitivity. What are the controlling factors in determining the future of an organization? Which are the key decisions?

The present state of mathematical knowledge is such that mathematics cannot yet supply behavioral scientists with flexible tools to trace through the behavior of dynamic systems involving more than one or two variables. By their very nature the behavioral sciences require that multivariate systems be analyzed.

The ability to be able to "have a look at" the consequences of an assumption concerning the behavior of an individual, organization, or set of individuals or organizations is, in the estimation of this writer, as important to the behavioral scientists as the ability to use a microscope is to the biologist.

By gradually building up more and more detailed simulations

of the firm, the economist should be able to examine many hypotheses concerning major decision processes. He should be able to check those implications of his present theories which, owing to their complexity, cannot otherwise be checked.[33] The same technique should prove valuable in other areas.[34]

BUILDING OF THE ECONOMIC MODEL

Work on a simulation is in process. Before its scope could be decided, it was necessary to investigate the information sources and survey the state of knowledge concerning the decision processes. After the adoption of the hypothesis that economic man with slight modifications would supply the material from which the decision processes of the firm could be described for an initial simulation, several departments of a firm were investigated.

Some of the more important decision areas appear to belong more to the domain of "heroic man" than to his economic counterpart. Economic man appears to play his role in setting limits on the internal allocation of funds, while heroic man spends the funds on innovation, advertising, and new investment. In other words, (except in the very broadest sense) the economic theory of allocation of funds so that "marginal productivity is the same in all uses," tells us very little about the allocation of funds.

In advertising few advertisers appear to have more than a hazy idea of their effect on the market. In certain cases they may use a rule of thumb such as: "If you wish to maintain your share of market, let your percentage of advertising equal your market share." It is difficult to judge the motivation of the decisions to spend money on institutional and "educational" advertising. The actions appear to stem more from conditions concerning the self-image of the firm and its prestige than from an implicit or explicit attempt to maximize long-term profits. Owing to lack of information concerning customers the concept of marginal value productivity with respect to advertising does not seem to have

[33]Austin C. Hoggatt, *Simulation of the Firm* (International Business Machines Corp. Research Paper RC–16, Aug. 15, 1957).

[34]Guy H. Orcutt, Martin Greenberger, Alice M. Rivlin, with the assistance of John Korbel, Lawrence Krause, Stephen Lictenbaum, Nancy Proger, and Robert Soloway, *Decision-Unit Models and Simulation of the United States Economy* (preliminary and incomplete draft, Jan. 1958).

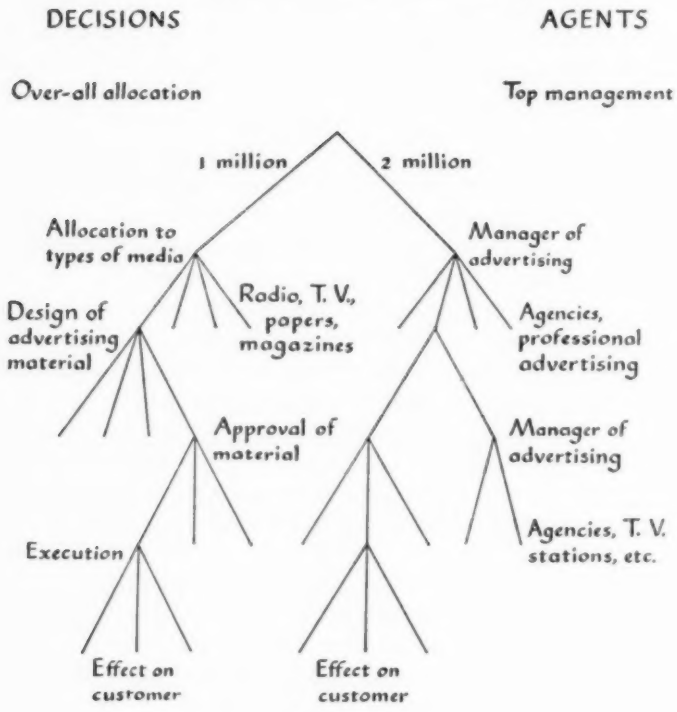

Figure 2.

influence in advertising decisions, except to the extent that economists and operations research workers have explained the concept.

When we speak about "the decision to advertise" we are speaking about a hierarchy or sequence of decisions. At the topmost level is the decision to allocate funds internally for advertising over a period of time. This is followed by the functional work of deciding how to allocate the funds to different media and levels of distribution. The processes can be illustrated by a tree as in Figure 2.[35] The top two decisions are of direct interest to the economist; neither appears to be predictable by a theory utilizing economic man.

The decision processes involving investment, innovation, and

[35]Von Neumann and Morgenstern, *op. cit.*

pricing present many of the same problems encountered in advertising. Rules of thumb designed to cope with uncertainty and to limit the number of alternatives to be examined take the place of laws of maximization.

The important decisions of production scheduling and inventory policy appear to be different. The reason for this difference is the mounting effect of operations research and economics on industry. What Feeney has called the tactical part of production scheduling and inventory decisions[36] is characterized by conscious economic effort to minimize costs subject to the restraints imposed by the strategic decisions. He points out that the strategic decisions in production scheduling and inventory policy involve the assigning of safety levels and out-of-stock penalty values. These decisions do not lend themselves to explanation by a simple maximization principle.

The initial simulation includes production scheduling and inventory policy. Among the basic questions which this simulation will attempt to answer are: Do the methods for deciding upon production schedules and inventory policy appear to be compatible with the methods advocated by economic theory? Given various criteria for judging the superiority of one decision rule over another, are the methods used superior or inferior to those recommended by economic theory?

DECISION MAKING: A MULTIDISCIPLINARY APPROACH

What generalizations about the substance and the method of decision making are suggested by this and the other articles in this issue? Without implying that they are either inclusive or conclusive, the following tentative "invariants" seem to appear:

1) Three of the papers in this issue deal with different aspects of the firm and one with foreign policy decision making, but all are primarily concerned with *group decisions*. The paper by Kadushin is the only one dealing solely with a decision by an individual to undergo psychiatric treatment.

2) All five, using different approaches, treat the act of decision

[36] George J. Feeney, A Basis for Strategic Decisions on Inventory Control Operations, *Management Science*, 2 (Oct. 1955).

making as a *sequential process*. By doing this, a clear connection is established between the decision-making organism and its environment. Furthermore, all lay stress on limited information and the uncertainty present due to the organism's lack of information concerning its environment and, in some instances, the high degree of change in this environment. As a corollary to the stress on sequential decision making the distinction between major and subsidiary decisions is made. In Kadushin's paper these are categorized as casual decisions or depth decisions, elsewhere as tactical and strategic decisions.

3) Explicit in all of the papers is the recognition of the need to deal with multivariate dynamic systems of considerable size. Several different approaches are adopted. These include generalizing from case studies based on interviewing and observation, the utilization of an "accounting system" for the analysis of personnel interviews, the employment of a conceptual scheme based on sociological and psychological variables in the analysis of historical data and interviews, the use of observation and interviewing to construct a simulation, and the employment of operations research techniques.

4) All the papers except that of Dean place considerable stress on the nonrational aspects of decision making. This is included in Dean's paper in his comments concerning the stating of the problem and the design of measures of effectiveness.

5) Cyert, Dill and March conclude in their paper that the methods they observed in use by firms for computing alternative courses of action were simple, that expectations were closely interlinked to hopes, and that the search for extra information could not readily be explained by the theory of optimum allocation of resources. These conclusions are in agreement with the results of the investigation preliminary to the construction of a simulation noted here. They also contain much in common with Kadushin's discussion of self-image. The individual and the firm want to preserve their self-images. The decision to change the picture of themselves calls for several stages of exploration and learning. At any stage the processes may be terminated without final action being taken.

R. M. Cyert, W. R. Dill,
and *J. G. March*

The Role of Expectations in Business Decision Making

From an extended sequence of observations of decision making in three firms, four examples of how management uses expectations in making internal investment decisions are analyzed. The analysis suggests that although expectational data are an important element, they do not enter into the decisions in quite the way anticipated by standard theories of business behavior. In particular, four characteristics of these decisions are discussed: the extent to which resource allocation reflects comparisons of marginal advantages of alternatives; the extent to which search activity is viewed as one of the competitors for internal resources and the nature of search activity in a business organization; the type of computations about alternatives that are made and used in a decision; and the interaction between expectations and personal and subunit preferences.[1]

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[1]The authors wish to acknowledge their indebtedness to C. J. Haberstroh and D. B. Trow, who, along with W. R. Dill, made the original empirical observations on which these analyses are based, and to H. A. Simon, who was also a member of the research group. They also wish to thank the firms in which the studies were made for their co-operation. The research was supported by grants from the research funds of the Graduate School of Industrial Administration and from funds provided by the Ford Foundation for the study of organizational behavior.

THEORIES of organizational decision making have ordinarily made rather sharp distinctions between business and public organizations. Particularly striking is the contrast between the best-developed theories of business decisions—the economic theory of price and administrative theory—and the portrayal of public bureaucracies to be found in recent sociological and political theory. The contrast rests, rather explicitly, on two fundamental differences: the treatment of goals and the treatment of expected returns and costs.[2]

The theories of business behavior assume that an organizational goal is given: organizations attempt to maximize profit. They assume that the goal is operational: organizations know when they are and when they are not fulfilling that goal and what course of action will satisfy the goal. Although we believe this conception of organization goals to be fundamentally wrong in some important respects, we consider it in this paper only parenthetically.

We wish to examine here the treatment of expected return and expected costs in the classical description of business behavior and to consider in the light of the classical theory and some recently proposed revisions of it four specific decisions involving estimates of cost and return made by business organizations. Although the data are hardly conclusive, we think the case studies suggest rather strongly some important modifications in our views of the functions of expectations in organizational behavior.

EXPECTATIONS IN THEORIES OF BUSINESS BEHAVIOR

Theories of business decision making generally assume that estimates of cost and return *in some form* are made by the firm and that investment behavior depends heavily on such estimates. For example, the standard theory of price treats investment and internal resource allocation as hypersimple problems in maximization. The firm invests in each available alternative to the extent that the marginal return from each alternative will equal the opportunity cost. Except insofar as sunk costs are involved, the firm makes no fundamental distinction between internal and external investment; that is, all marginal returns are equal to the best alternative return

[2]Compare, for example, G. J. Stigler, *The Theory of Price* (New York, 1946) and J. M. Gaus, *Reflections on Public Administration* (Birmingham, Ala., 1947).

available. Under these conditions, "efficiency"—the ratio of obtained to potential return—is equal to one.[3]

What conception of organizational decision making is implicit in such theories? They assume that the organization scans all alternatives continuously and just as continuously adjusts its portfolio of investments to changes in the pattern of alternatives available. They assume that firms have accurate information on the costs to be incurred and returns to be received from alternatives and that decisions are made on the basis of this information. As will be noted below, these assumptions have been attacked both by economists and by organization theorists.

Attempts to revise the standard theories have been designed primarily to modify these assumptions through the introduction of probability distributions and the substitution of expected profit (or utility) for the profit (or utility) originally specified.[4] The "modern entrepreneur" is probabilistically omniscient. He knows (with certainty) the probability distribution of outcomes from all alternatives. He can, therefore, compute the expected value of any particular alternative and equate expected marginal return with expected opportunity cost.

At the same time, the assumption of infinite search has been replaced by a theory of search that recognizes certain costs to search and thus makes allocation of resources for securing information one of the investment decisions to be made. The modern entrepreneur does not scan all alternatives nor does he have all information about all alternatives. He invests in information only so long as the marginal expected return from the information gained exceeds the expected opportunity cost.[5]

There is general consensus that these theories, and specifically the economic versions of them, have been rather valuable in both normative and empirical analyses of aggregate behavior. Since this has been the major traditional interest of economic analysis, aggregate economic theorists have found no pressing reasons for re-examining the assumptions of the standard theories.

On the other hand, economists and others interested in the

[3]Stigler, *op. cit.*

[4]M. Friedman, *Essays in Positive Economics* (Chicago, 1953).

[5]B. O. Koopman, The Theory of Search I, *Operations Research*, 4 (1956), 324–346.

behavior of the individual firm have not been entirely satisfied with the classic assumptions, which have been subject to criticism on two major grounds.[6] As normative theory, they have been challenged for accepting too easily Bernoullian expected utility. Alternative formulations, arising primarily from game theory considerations, are preferred by a vocal, but apparently minority, group.[7] The normative uses of the theories, however, are tangential to our main interest here. We are more concerned with the challenges to these theories as explanations of business behavior. Because we wish to consider some empirical studies of business decision making, we will specify these challenges in somewhat greater detail.

There have been four major objections to the more or less "pure" theory of expectations insofar as it has been applied to the behavior of individual firms.

First, the theories assume continuous competition among all alternatives for all resources. As Coase has pointed out, the perfectly competitive market for internal resources is a major implicit assumption of the standard theory of the firm.[8] Such a description of organizational behavior is distinctly different from that implicit in many treatments of other organizations. For example, public administration models seem to emphasize local adaptation to specific problems; they stress problem solving much more than planning.[9]

Second, the theories make search activity (and thus information) simply one of the several claimants for resources to be evaluated in terms of calculable costs and expected returns. Simon and others have questioned this treatment of search behavior.[10] They have placed considerable emphasis on dissatisfaction as a stimulant to search, on the "conspicuousness" of alternatives as a factor in their consideration, on external effects on the generation of information, and on the sequential characteristics of alternative evaluation.

[6]For a thoughful recent statement, see T. C. Koopmans, *Three Essays on the State of Economic Science* (New York, 1957).

[7]D. Luce and H. Raiffa, *Games and Decisions* (New York, 1957).

[8]R. H. Coase, The Nature of the Firm, *Economica*, 4 (1937), 386–405.

[9]E. Devons, *Planning in Practice* (Cambridge, Eng., 1950).

[10]H. A. Simon, A Behavioral Model of Rational Choice, *Quarterly Journal of Economics*, 69 (1955), 99–118.

Third, the theories require substantial computational activity on the part of the organization. Shackle and others have argued that the theory grossly exaggerates both the computational ability and, more important, the usual computational precision of human beings.[11] A number of suggestions for constraining the amount of information that must be digested have been made. For example, the heart of Shackle's theory (still completely untested) lies in the ϕ-functions by which the attention value of a particular outcome is determined.

Fourth, the theory treats expectations as exogenous variables. They are given, not explained. But such an eminently logical extension of certainty theory to the treatment of uncertainty ignores a major psychological aspect of uncertain situations, the interaction of expectation and desire. Quite aside from such an interaction, taking expectations as given in a theory of business behavior seems similar to taking the outcomes of all individual games as given in a theory of baseball championships.

Patently, it is not easy to test the validity of either what we have called standard theories or the proposed revisions we have mentioned. However, this paper reports detailed studies of four major decisions in three firms. On the basis of an analysis of these four decisions, we arrive at some tentative hypotheses about the problems mentioned above with respect to the theories of investment and internal resource allocation. In particular we will raise some questions about the usual notions of the role of expectations in organizational decision making.

METHODS OF OBSERVATION

The three firms are all well-established, successful organizations: one a large, heavy manufacturing concern, another a medium-sized construction firm, and the third a medium-large manufacturing and retailing concern. Each of the firms gave the research group full access to files and to the activities of the organization. The decisions and the studies were made during 1953–1956. Three basic techniques of observation were used: (1) detailed analysis of memorandums, letters, and other written file material; (2) intensive interviews with participants in the decisions; and (3) direct obser-

[11] G. L. S. Shackle, *Expectations in Economics* (Cambridge, Mass., 1949).

vation of the decision process. The first two techniques were used in every case. All pertinent documents in the companies' files were examined. All participating members of the organization were interviewed at least once; key members were interviewed repeatedly. In two cases (the second and fourth below), an observer from the research team was present virtually full-time in the organization during the time the decision was being made. He was attached directly to a staff member in the organization and attended staff meetings. In the fourth case, the observer was permitted, in addition, to tape-record important meetings.

The data on the decisions are, therefore, as complete as the limits of memory (both organizational and personal), interview technique, and observer ability permitted. Since those limits can be surprisingly restrictive, some questions of detail could not be answered. Nevertheless, the case studies described below are based on substantial information, direct and indirect. For purposes of presentation they have been condensed considerably, and emphasis has been placed on one aspect of the situation—the role of expectations. We are well aware of the dangers in such an abstraction, and we scarcely hope that four case studies, however detailed, will allay the skepticism of critical readers. The justification lies in our belief that the key propositions we want to make are conspicuous in the data and in our hope that the data will provide a start for empirical research in an area of extensive *ad hoc* theory.

THE DECISIONS

Decision No. 1: A Problem in Accelerated Renovation of Old Equipment

The first decision problem we shall analyze arose in a branch plant of a heavy manufacturing corporation employing several thousand workers and divided into semiautonomous operating divisions—seven major divisions and several smaller ones. Auxiliary service departments such as safety reported to the plant manager and his assistants, but most such departments had liaison personnel assigned to the operating divisions.

An important goal of management was to achieve a better safety record than other plants in the corporation and in the industry. Particular stress was placed on eliminating fatal accidents and on

achieving annual reductions in the frequency of "lost-time" injuries. Making the plant as safe a place to work as possible was more than a plant goal; it was a personal objective of most members of top management in the industry.

All the large divisions and most of the small ones made extensive use of overhead cranes. The movement of most cranes was governed by an old type of controller. Most cranemen and supervisors preferred magnetic controllers, a newer type that had been installed on many cranes in the plant. Because magnetic controllers operated on low-voltage control circuits, there was less danger of severe shock or of "flash"—visible arcing of current across contact points —than with the old type, which operated on full-line voltage. Magnetic controllers also allowed operators to direct crane movements more precisely: there was less danger of "drift," or unanticipated movements. Since they used less cab space than some older controllers, they offered the craneman better visibility and more work space. They were also supposedly cooler and less fatiguing to operate, as well as easier to maintain.

The actual safety benefits that would accrue from the replacement of old-type controllers with magnetic controllers were hard to estimate. Burns, shocks, and eye injuries resulted from "flash" in the older controller circuits, but they were infrequent and were not often disabling. Injuries caused by movements of cranes were more frequently attributable to human error by cranemen or ground crews than to mechanical failure of the controllers or to "drift."

Change-overs to magnetic controllers were being made only as the older controllers wore out, until a fatal accident in the plant triggered recommendations for an accelerated replacement program. A worker was killed when the unexpected movement of a crane load pinned him against a wall. Investigation by top management and by the safety department led to recommendations for a general review of problems of crane safety. The plant manager appointed a special committee to recommend steps that could be taken to improve a craneman's view of his working area and to give him better control over crane movements. The committee consisted of the director of safety, the superintendents of two operating divisions, and a man from the plant engineering department.

At the initial investigation of the accident, the craneman had been asked the type of controller with which the crane was equipped; but no links had been suggested between type of controller and the accident. Blame was assigned to the victim for standing in an unsafe position, to the craneman for moving a lift when his view was obscured, and to management for improper stacking of materials on the floor.

The special crane-safety committee did not mention magnetic controllers in its first report of recommendations for the division where the accident had occurred. Not until their seventh meeting, several weeks after the accident, while investigating conditions in a second division, did the committee discuss a suggestion for accelerated change-over of magnetic controllers. The change would "save space in the crane cab" and provide better control levers, but the committee feared initially that "the cost would be excessive."

Apparently the committee changed its evaluation of the costs of the change, although minutes of the meetings do not report any further discussion. In its final report to the plant manager, the committee recommended as one of several changes that the controllers then in use "should be replaced by magnetic controllers as quickly as feasible." The plant manager circulated the entire list of recommendations without change to the division superintendents and asked that they all be adopted and implemented promptly.

After the order for implementation, specific questions of cost were raised and searches for information were initiated. Most division superintendents individually made quick estimates of the minimum cash outlays required for purchase and installation of the new controllers and checked with the plant manager to see if these expenditures would be approved. Their estimates ranged from $27,000 to $50,000 per division and were described by the safety director as "an absolute minimum" since they did not cover all expected costs of installation.

To supplement the divisional estimates and to fit the accelerated replacement program into operating budgets, the plant manager asked the chief engineer to make a plant-wide survey of requirements and installation costs. Four months after the accident the chief engineer asked the special crane-safety committee to draw up detailed plans for the replacement program and suggested that

the program be included in the following year's budget. He wrote, "It may be an expenditure between $150,000 and $200,000."

Seven months later, in another memorandum to division superintendents, the chief engineer was still asking for an itemized list of cranes that needed the new controllers and of the number of replacements each such crane would need. At this time he described the program as a five-year job with budgeted expenditures of $100,000 a year.

The chief engineer was not the only one exploring costs and benefits of the program. In the meantime one of the division superintendents had announced the program to a plant-wide conference of management personnel. He said that with the installation of magnetic controllers they would "virtually eliminate" injuries to cranemen from flashes and burns. Several other division superintendents prepared a memorandum summarizing their objections to the old-type controllers. The chief industrial engineer reported to management that for the new magnetic controllers "any increased costs in operation will be negligible." He mentioned the old-type controllers as a "cause" of the fatality which had initiated the program.[12]

Early in the second year of the program the plant manager asked the superintendent of maintenance to co-ordinate the replacement program over the next several years. By the ninetieth week after the accident the superintendent of maintenance had developed a revised plan for replacements. The estimated number of replacements had been decreased from 344 to 250, the estimated total cost increased from $500,000 to $600,000, and the estimated time for completion of the program increased from five to six or seven years. He reported costs in terms of the program's encroachment on men and facilities needed for other projects to which the maintenance division was committed. This was the first time in the written memoranda on the program that an estimate of available man power to install the controllers was cited as a limit to the completion of the program.

Initially, then, the program for accelerated replacement of controllers had been judged expensive but feasible. The original

[12]If this had been the case, it definitely had not been brought out in the detailed records of the inquiries following the accident.

recommendation for the program had been promulgated along with a number of other suggestions for increasing crane safety that could be implemented less expensively in the short run.

The first year and a half after the program was approved by the plant manager were used to explore the scope of the decision and to plan for its implementation. Specific estimates of cost quadrupled in that time (rising from $150,000 to over $600,000); and the estimated time for completion changed from about two years to seven or more. Apparently the firm's commitment to an accelerated replacement program was made before the cost of new installations and the impact of the project on other commitments for maintenance and expansion were fully known. The development of cost information is summarized in Table 1.

Table 1. The sources and uses of cost information in crane control decision.

Time since fatality (wks.)	Evaluation expressed in available correspondence	Source of evaluation	Context of evaluation
6–11	New controls would save space in cabs and offer better control levers; cost of plant-wide program might be "excessive"	Crane-safety committee	Series of meetings to find ways to increase the safety of crane operations
11	Accelerated, plant-wide installation of new controls is feasible	Plant manager	Directive to division superintendents to carry out such a program
13–19	"Absolute minimum" costs for purchase and basic installation would be $27,000 to $50,000 per division	Division superintendents	Individual requests to plant manager for approval of expenditures
20	Program will take at least a year and may mean expenditure of $150,000 to $200,000	Chief engineer	Guide to plant manager for fitting program into next budget

Time since fatality (wks.)	Evaluation expressed in available correspondence	Source of evaluation	Context of evaluation
22	New controls will virtually eliminate injuries to cranemen from flashes and burns	Division superintendents	Speech at annual management safety conference on his division's progress
49	Program will take 5 years and will involve budgeted expenditures of $100,000 a year	Chief engineer	A request to division superintendents for more precise information on their requirements
52	Increased costs of operation with new controls will be negligible	Chief industrial engineer	Memorandum to the plant manager and division superintendents
55	New controls will be safer, easier to use, and cheaper to maintain	Group of division superintendents	Memorandum to inform others in management
95	Program will take 6–7 years, will require 250 installations, and will cost $650,000; rate of progress is limited by other maintenance commitments	Maintenance division superintendent	Report of plans to the chief engineer
106–112	Lack of funds prevents further work on program	2 division superintendents	Report to director of safety on progress of program

In the end the commitment proved vulnerable, not to revised estimates of cost, but to short-run declines in available resources. At the end of two years two divisions stopped work on the program because a decline in operations had reduced their funds. One year later almost all divisions had reverted, for similar reasons, to the

policy they were following before the accident; they were installing magnetic controllers only as the older control systems wore out.

Three major features of this decision process are particularly interesting from the point of view of the place of expectations in a theory of business decision making. First, it is clear that search behavior by the firm was apparently initiated by an exogenous event, was severely constrained, and was distinguished by "local" rather than "general" scanning procedures. Second, the noncomparability of cost expectations and expected returns led to estimates that were vague or easily changed and made the decision exceptionally susceptible to the factors of attention focus and available organizational slack. Third, the firm considered resources as fixed and imposed feasibility tests rather than optimality tests on the proposed expenditure.

The search behavior is difficult to interpret. The apparent sequence is quite simple: accident, concern for safety, and focus (among other foci) on magnetic controllers. As a view of top management, such a sequence seems to be reasonably accurate. Underlying this sequence, however, are a number of factors that make too simple a theory of organizational search unwarranted. Most conspicuous is the fact that the connection between the stimulus (fatal accident) and the organizational reaction (new controllers) is remote. There is no evidence that the fatal accident depended in any way on the type of controller used on the crane. At the same time there is little doubt that the accident had made members of management give greater priority to any device that would improve crane safety and that the possibility of new controllers was well known to parts of the organization. Thus organization search for safety alternatives at the level of top management can be viewed at lower levels as the promotion of favored projects under the impetus of a crisis. The alternative of magnetic controllers was discovered not so much because the organization at this time searched everywhere for solutions to a problem but because some parts of the organization were already (for whatever reason) predisposed toward the project and (a) thought of it as relevant and (b) were able to present it as relevant to the perceived problem in safety.

The decentralized characteristics of information gathering in

this case are particularly striking in the pursuit of cost information. Cost information was not readily available, especially to the men who were charged with investigating crane safety. Each knew something about the costs of a single installation since some of these had already been made. But none of the four had the information needed for even a rough approximation of the over-all costs of an accelerated replacement program; and, as later searches showed, many people and much time would have been needed to gather such information. Even after the decision to make the plant-wide installations, when detailed cost and return data were sought, every new group brought in costs and advantages that other groups had not considered (see Table 1).

One of the reasons why detailed information on costs seems to play such an insignificant role in all but the final stages of the process is that at no time did the organization make a conscious calculation of costs and return in comparable figures. This feature of the decision is conspicuous in Table 1. Information about costs was not necessary to persuade members of management to order the installation of the controllers. All members of management apparently favored the new controls, and they were supported by noncompany technical literature. They had been putting the new controllers in as the old systems wore out. Statements made by the division superintendents indicated that they were placing strong positive emphasis on the safety advantages of the new controls. These gains were usually expressed in absolute rather than relative terms. None of the safety advantages and few of the operating advantages were ever formally expressed in dollar terms. There was consensus that the program would be beneficial and evidence that the benefits—whatever their size—would apply in several departments: safety, maintenance, and operating divisions.

Under these conditions it is not surprising that the early cost estimates were too optimistic (at least if we can assume later ones were more accurate). It is also not surprising to discover that variations in cost expectations had little impact on the basic decision until the focus on safety became less intense.

Measurable expectations entered in the decision only in the feasibility test. Do we have money for the controls? Initially agreement by various groups in management that the step was a good

one and an estimate that costs—while unknown—would not be unreasonable were apparently sufficient to carry the decision. For costs to be reasonable under the standard theory of investment, they must be better (relative to the gain) than other available alternatives. This was not, however, how the issue was formulated here. Rather the question of "reasonableness" hinged on whether the expenditure could be made without appreciably affecting existing organizational arrangements adversely (e.g., profits, dividends, wages, output).

As long as estimated costs were modest and output high, the costs were reasonable. As the costs grew and business activity declined, accelerated installation of the magnetic controllers became less "reasonable." This was obviously not because they became suboptimal whereas they had previously been optimal but simply because the supply of uncommitted resourecs (one form of organizational slack) had been substantially reduced. The later stages of the decision were dominated by the necessity of making specific provision for the program in the plant budgets and of preparing tentative time schedules for installation. When, at this stage, there was not enough money for all of the approved projects, some comparisons of the relative merits were made. At that time the hierarchy of preferred projects seemed to reflect such considerations as the tangibility of their expected return, the importance of their major supporters, and the conspicuousness of the problem for which they were designed. It is of course possible that such a process would also generate the optimum set of investments. We will note only that the explicit decisions made by two divisions to abandon the program seemed to be timed specifically in relation to declines in their level of operations. When it became apparent that cash would not be available to meet more than the bare minimum of repair and maintenance commitments, the two divisions stopped work on the accelerated program completely and returned to preaccident policies.

Decision No. 2: A Problem of New Working Quarters for a Department with a Doubtful Future

The second decision was an attempt in a medium-sized construction firm to find new working and storage quarters for its

Home Specialties Department, which held a unique and somewhat insecure position in the firm. Its customers were not often shared by other departments. It used union labor like other departments of the firm, but unlike most of its competitors; therefore, its labor costs were too high to enable it to bid successfully on many projects. Its labor costs and changes in style and technology in the construction industry were causing the department's market to shrink, though it had shared with other departments in the growth from new construction activity during and after the Korean War. Top management expected its sales to decline, and its members outside the Home Specialties Department had negative feelings toward the department for two reasons: (1) The head of the department was a senior man in the firm and his earnings under a profit-sharing contract were higher than the earnings of almost all other department heads. (2) Other departments were also expanding, and some of these were anxious to take over space that was being used by Home Specialties.

The problem of making a decision about the long-run importance of Home Specialties operations and of providing plant facilities to accommodate expanded operations had been current for at least two years. Management had long been aware of the need for some kind of action. However, there was no consensus about what the critical problem was or about what alternative would be satisfactory. The president, who believed centralized operations were most efficient, initially viewed the problem as one of finding a way to expand facilities at (or in the immediate vicinity of) the current site. The head of the Home Specialties Department wanted to move the department to a new location, where it would not be in conflict with the operations of other units. Some members of general management thought that the department should be dropped from the firm in order to release working capital for units that had a brighter future. The president and the branch manager had talked of maintaining the department but of limiting it to a size that fitted the existing site, of reducing the share of profits going to departmental personnel, and of forcing the head of the department to take a cut in earnings. Some years earlier, a few men had almost managed to force the department manager out of the firm.

The president's show of interest when a local plot of land became available, coupled with continuing pressure from departmental management to investigate possible new sites, resulted in a decision to concentrate on the search for a new site. Study of the feasibility of moving the department may have seemed timely, too, because of the president's independent decision to renegotiate profit-sharing contracts with departmental management. Since the department manager and his assistant wanted to move, a decision to support their search for a new location might have been regarded as an inducement to them to accept a cut in earnings. In addition, the move might make it easier to follow the cut in earnings with a later decision to curtail departmental operations or to ease the department out of the firm.

Requirements for the new site were set forth in a conference attended by the branch manager, the department head for Home Specialties, his assistant, and a specialist in estimation of costs of building alterations. The pressures on current facilities, at least, were not expected to increase greatly over the next year or two; and in fact, the space requirements of Home Specialties were expected to decline. The Home Specialties facilities were probably not grossly unsuited to their operations; in defining the requirements for a new site, the head men in the department were merely trying, on most measures, to find something that would be equivalent to what they already had. The assistant head of the Home Specialties Department initiated most suggestions for site requirements. He worked from a memorandum he had prepared earlier. The final set of requirements was drafted by the branch manager after the meeting. The key specifications are set forth in Table 2.[13]

The conference was notable for the absence of real debate about or explicit consideration of the relative importance of different kinds of requirements. The discussion was oriented toward making sure that the new site would offer the same facilities as the old one at no greater cash outlay for rent rather than toward determining what would be a "most efficient" site for the Home Specialties Department. The most intensive discussion for several requirements centered on reaching an agreement as to what facilities the

[13]Other specifications were discussed initially, but they did not figure explicitly in the later evaluations of actual sites.

Table 2. Selected site characteristics: aspirations versus actions.

Features of site	Existing facilities	Proposed requirements			Characteristics of 3 best sites		
		Requested by Dept.	Agreed on in meeting	Listed by branch mgr.	No. 2	No. 14	No. 10
Total space, sq. ft.	25,000	25,000+	24,000	26,000	24,000+	18,500	15,500
Yard storage space	8,850	8,850	8,850	9,000	Available	Not available	Available separately
Heating facilities	——	——	Work area to 60°	Work area to 60°	——	Will cost $150/yr.	Will cost $183/yr.
Location (minutes from main office)	0	——	10	10	9	More than 10	About 10
Dock-height unloading space	——	Desired	Desired	Desired	Has	Has	Does not have
R.R. siding	——	Not mentioned	Worth $500 extra rent	Worth $1,000 extra rent	No	No	1¼ blocks from R.R.
Annual rent	$6–7,000	——	$10,000	$10,000	Bid of $10,000 submitted	Bid of $12,025 submitted	Bid of $17,000 proposed

department had in its current location. The question of the flexibility of various requirements was hardly raised, although it was unreasonable to expect to find a site that corresponded to all of the committee's specifications.

An intensive search for sites followed the conference and lasted for four months. The evaluation of each site about which information was received was a three-phase process. First, the branch manager or another member of the central management group looked at the initial information that was available from advertisements, phone calls, or cursory visits to the site to decide whether the site was worth further inspection. As Table 3 indicates, at least 18 sites were rejected at this stage because they failed to meet one of a small set of requirements. The most important considerations at this stage were: (1) whether the site could be rented (the company did not want to purchase), (2) whether the site was located near the company's existing facilities (something within 10 minutes' driving distance was preferred), and (3) whether the site was approximately the right size (sites with 15,000 to 25,000 square feet were preferred). One or more of these three factors underlay the rejection of eleven of the eighteen sites in this early phase. (Of the remaining seven, one was rejected because of problems of access, one because of an unsatisfactory layout, and five for unknown reasons.)

The second phase consisted of a more detailed evaluation of the site's potentialities. Four sites were given detailed consideration. Members of the Home Specialties Department staff estimated the expenditures required to make the necessary heating, lighting, and ventilating installations. One of the four sites was rejected after the detailed inspection because the branch manager found it liable to frequent flood damage and because the company would have had to buy other leases on the property.

There were, then, three sites that management thought good enough to prepare bids on. Looking at the major criteria of space, price, and nearness to existing facilities, we note in Table 3 that management relaxed its requirements as time went on. Site No. 2, the first one for which a bid was prepared, had an area about the same as the specifications called for; but sites No. 14 and No. 10 were both smaller than the specifications required. Site No. 10 was

Table 3. The consideration and disposition of possible sites.

Site No.	Period of consideration	Disposition of site
1	June 14	Rejected: Inadequate access
2	June 20—Sept. 13	Bid upon: Bid of $10,000+ not accepted
3	June 23—July 12	Rejected: Considered in detail but too large and too liable to flood damage
4	July 6	Rejected: Too small, too far away
5	July 12	Rejected: Would have to be purchased
6	July 12	Rejected: Too far away
7	July 12	Rejected: Too far away
8	July 17	Rejected: Too large
9	Aug. 9	Rejected: Unsatisfactory layout
10	Aug. 18—Oct. 24	Rejected: Bid prepared but not submitted: considered too expensive by president
11	Aug. 24	Rejected: Reason unknown
12	Aug. 24	Rejected: Reason unknown
13	Aug. 30	Rejected: Too small (13,000 sq. ft.)
14	Aug. 30—Sept. 25	Bid upon: Bid not accepted by owner, who preferred commercial use of property
15	Sept. 7	Rejected: Too far away
16	Sept. 7	Rejected: Too far away
17	Sept. 12	Rejected: Would have to be purchased
18	Sept. 12	Rejected: Would have to be purchased
19	Sept. 12	Rejected: Too far away, wrong size
20	Sept. 17	Rejected: Reason unknown
21	Sept. 18	Rejected: Reason unknown
22	Sept. 21	Rejected: Reason unknown

at and site No. 14 was beyond the distance limits set by management. Management expected to get by on site No. 2 with a bid of $10,000 to $15,000 for 24,000 square feet of space; the bid on site No. 14 was $12,000 for 18,500 square feet. On site No. 10, the third one for which a bid was prepared, management considered offering $17,000 for 15,500 square feet of space (excluding yard space which had to be obtained separately).

The bids on sites No. 2 and No. 14 were turned down by the agents for the properties, but the bid on site No. 10 was never submitted. The president refused to approve the bid because he

thought it offered too much money for too little space. The search for a new site for the Home Specialties Department apparently ended with the president's refusal to approve a bid for site No. 10.

Why were other sites not considered? Among the reasons for ending the search, the following were probably most important: (1) The branch manager and the others who had been most active in the search probably felt that they had explored most of the available possibilities. They had even resorted to driving around the neighborhood looking for "for rent" signs. (2) The earnings contracts of the departmental managers had been renegotiated—most of them successfully. Use of the search for a new location as an inducement to counteract the negative effects of renegotiation was no longer of any importance, and, with renegotiation completed, one point of friction between Home Specialties and other departments had been eliminated. (3) Contrary to expectations, Home Specialties had continued to maintain a fairly high level of operations over the summer, while its most direct competitor for work space had suffered a decline in business.

The decision-making process here has some significant similarities to that connected with the purchase of automatic controllers. As before, search activity represented a response to some specific events rather than a form of continued planning. Second, detailed expectation data entered into the decision relatively late, after a conditional commitment to secure space had been made. Finally, most of the tests were primarily feasibility tests rather than checks on optimality.

From the present point of view, perhaps the most interesting aspect to this study is the fact that the organization focused on the problem of outside space for the department. Although the decision was contingent (and was in fact never executed because bids were rejected), it represented a commitment to a course of action. Yet the commitment was made not because it was shown to have the best return, in terms of organizational goals, of a number of alternatives. Quite the contrary, the decision to find new quarters was made because a number of important parts of the organization, for apparently quite different reasons, viewed such a step as desirable. Had there been agreement, for example, between the Home Specialties Department and other departments about the

probable long-run consequences of this step, one or the other of those groups would probably have opposed the move. Since this was an important aspect of the decision situation, some of the more important expectations were not discussed in open meetings, and hopes and expectations appear to have become substantially intertwined. The role of ambiguity of expectations in securing agreement where there is a conflict of interests has previously been noted with respect to political and labor-management decision making. There is some suggestion here that it is also important for the formation of business policy.

Once the decision to secure additional space had been made, data on alternatives were organized around a set of more or less independent criteria. These criteria are interesting in two respects: (1) they represent for the most part a simple statement of current facilities. The adequacy of some aspects of these facilities was discussed, but the general question of what would constitute an ideal site was not raised. (2) With one or two exceptions (e.g., an attempt to place a rental value on the existence of a railroad siding) the specifications represented a check list. Sites that were unsatisfactory on one or more of the major criteria were rejected immediately. Only among the more or less "satisfactory" alternatives was there an attempt to compare the utility of an increment on one dimension of the criteria with a different dimension. And even at that point this comparison was somewhat halting and not always easily understood. Some of the sites rejected at an early stage might have been considered more thoroughly later, after management's aspirations declined.

In one conspicuous feature the site purchase decision was different from the decision to purchase the automatic controller. The search for alternative sites was much more exhaustive than the search for alternatives in the first case. The organization did not have a ready-made site alternative but had to look. Although it is conceivable that the organization did not discover all the alternatives that were within 10 minutes of the central office, it seems unlikely that they missed any that would have been suitable. To be sure, the use of the 10-minute criterion as a device for defining the range within which one would search made that criterion into an absolute one, in the sense in which the others (e.g., the size

requirement) were not. But the difference between the number of alternatives considered in this instance and in the crane case is substantial. Similarly, the specific cost estimates reflected in proposed bids for sites and the decisions on whether to make the bids seem, in this case, to be more attempts to determine the intrinsic worth of the property to the organization and less a function of available resources than they were in the previous case.

Decision No. 3: Selection of a Consulting Firm

The third decision is part of a larger decision regarding the installation of an electronic data-processing system. It relates specifically to the selection of a consulting firm. The company, a medium-large manufacturing concern, had made some preliminary investigation of the problem and decided that a consultant was necessary. At the beginning of the process of deciding which firm should be chosen there was no clear program as to how many firms would be evaluated. A list of possible consultants was prepared, but a series of chance circumstances led to a meeting with Alpha, a relatively new consulting firm specializing in the design of electronic data-processing systems.

On February 21 consultants of Alpha discussed the problem of improving business methods with people from the company. By March 23 Alpha had submitted a step-by-step program that would survey and analyze the company's operations and data-processing procedures. Alpha stated that the objective of this program would be (1) the estimation of savings that could be realized through the use of electronic equipment and (2) the specification of the price class and characteristics of equipment required. The fee expected for this work was stated at $180 per man day (i.e., $3,600 per month assuming one man works a 20-day month). The initial consulting task was to be limited to 100 man days, and consequently the fee was limited to $18,000. Traveling expenses of some $4,000 would also be charged.

The report was well received by company officials, who generally agreed that Alpha would be retained until the question was raised whether it would not be appropriate to investigate other alternatives. As will be obvious, this was a crucial point in the process, but it is not clear what prompted the suggestion for additional search

effort. The suggestion was rather quickly accepted, and a list of about a dozen potential consultants, which had been prepared earlier by a staff member, was presented. The controller decided that only one more firm should be asked to submit a proposal and that it should be Beta. Beta was more widely known, older, and larger than Alpha, although it did not so definitely specialize in electronic data processing.

Following analysis of the problem, Beta submitted a contract proposal covering an investigation of the company's problem. The stated objectives were two: (1) to reduce the costs of the accounting and clerical operation and (2) to improve the quality of information available for accounting and control. Beta stated in the contract proposal that employing electronic data-handling equipment was to be considered as a possible means of attaining these objectives. This contract outlined service charges that would not exceed $5,000 a month. The initial study was to be completed and a report submitted three to four months after active work began.

After Beta had submitted a report, it became necessary to choose between the two firms. At the request of the controller a staff member wrote a memorandum that listed the criteria on which the decision should be based and also evaluated the two firms on each of the criteria. The results of this memorandum are summarized in Table 4.

The staff member who wrote the memorandum believed that on quality of personnel, cost of services, and estimated time the two firms were equal or could be made equal by negotiation. On the other criteria—commitment made, availability and scope, and geographic situation—he felt Beta had an advantage. He was supported in this opinion by an academician who had previously served as a consultant to the firm. An analysis of the memorandum seems to show, however, that the only advantage that can objectively be given to Beta is its geographic situation. Even here, aside from availability, it is difficult to see any advantage. The only possibility would be higher traveling expenses for Alpha, but presumably this would mean a reduction in some other part of the fee. Again, it should have been possible to negotiate on availability and scope, assuming that geographic proximity is divorced from availability. It is quite obvious that the commitment could

Table 4. Comparison of consulting firms.

Criteria	Alpha	Beta
Quality of personnel	Depth in quality of computer personnel	More experienced in business problems
Cost of services	$180 per man day ($3,600 per month); $18,000 max. charge plus traveling expenses	$5,000 per month max. plus traveling expenses
Commitment made	Committed themselves *primarily* to study of feasibility of application of E.D.P.E.	Will give consideration to both *methods* and *possibility* of using E.D.P.E., in order noted
Estimated time	100 man days maximum; possibility of doing work in 15 weeks	Longer time allowed because of greater commitment (actual time stated in contract was 3–4 months)
Availability and scope	No quantitative evaluation mentioned	
Geographic situation	Main office approx. 2,500 miles away from company's office	Main office approx. 500 miles away from company's office

have been negotiated, for Alpha as a new organization in the field was open to suggestion with respect to the kind of commitments it should make.

On the cost side (ignoring possible negotiation) there was a probable advantage accruing to Alpha. The approximate monthly charges were $1,400 less for Alpha than for Beta. The total charge for Beta to the company varied according to the length of time it would take. The estimated length of time for Beta was 3 to 4 months, which would mean a price between $15,000 and $20,000. Alpha on the other hand had a maximum price of $18,000. Exact price comparisons under the circumstances were difficult to make.

However, Alpha gave a maximum total price whereas Beta used only a maximum monthly charge and no upper limit on the time. Thus what advantage there was in the cost situation probably was in Alpha's favor. However, the costs were close enough and the circumstances blurred enough so that relative cost was difficult to evaluate.

This fact was recognized by the staff members involved, who proposed that the decision be made on collateral grounds (e.g., geographic proximity, possible future uses). As noted above, the grounds specified seemed to favor Beta, and this preference of the staff was apparent almost from the moment that the decision to expand the search to Beta was made. That is, the staff members most closely involved seemed to view Alpha as a reasonable solution until the suggestion for further search was made. There is some suggestion that they interpreted the instruction to expand their search to include Beta and only Beta as a preference for Beta by their supervisors. The controller and assistant controller, on the other hand, felt that the final decision was based on the independent recommendations of their staff members and did not acknowledge the possibility that such an outcome was implicit in the decision not to accept Alpha until further investigation. The firm decided to hire Beta.

How did expectations with respect to cost and return enter the decision to hire Beta? First, the methods of search resulted in casual consideration of about a dozen possible firms, intensive consideration of two. Second, a comparison of the two firms finally considered was difficult. Expected costs and expected return were measured in a number of dimensions (e.g., fee, quality of personnel, convenience) that were not readily reduced to a single index. Third, given the difficulties of evaluation, there appears to have been substantial interaction between expectations and desires and between desires and perceptions of others' desires.

As in the case of the search for a new site for the Home Specialties Department there was some attempt here to be reasonably inclusive in searching for potential firms. Presumably if that original scanning had detected a firm that was conspicuously more appropriate than all others, that fact would have been noted. Since there were no conspicuous alternatives, it is not surprising

to discover that not many were evaluated in detail and that the factors affecting the choice of firms to consider in large part determined which firm would be selected. Alpha was considered primarily because it was momentarily exceptionally visible to a key staff member when the organization needed a detailed proposal. Beta was conspicuous to the controller because it was well known in the business community and had apparently been considered as a potential consultant on other occasions.

In evaluating the proposal by Alpha and later in comparing it with the one made by Beta, the people involved in the decision seemed to have done two things. First, they asked whether the charges were within the range of what it was reasonable for the organization to pay for the services offered. There does not appear to have been any significant problem on this score. Second, they asked which of the two proposals offered the better return on investment. As the description of the two firms indicates, this was by no means an easy job. The simple comparison of the two consulting firms in Table 4 has some interesting features. Perhaps most conspicuous is the fact that the conclusion to be drawn from the comparison is not at all clear. Reasonable men could quite easily disagree as to its implications. It was not that part of the return was in intangibles; all of the factors explicitly considered were reasonably tangible. The problem was that they were not reducible to a single dimension (or at least were not reduced to one) and that neither firm was better on all dimensions.

The ambiguity in expectations that arose from the difficulty of making objective rankings of Alpha and Beta resulted in a decision process that seemed to be dominated in large part by nonexpectational factors. The final staff memorandum of the decision clearly recommended Beta. This recommendation was accepted by the controller. As he put it, "I asked the boys to set down the pros and cons. The decision was Beta. It was entirely their decision."

The staff members involved, on the other hand, seemed to have felt that the decision to search further rather than hire Alpha immediately reflected some bias in favor of Beta on the part of top management, and this was probably reinforced by the fact that the controller specified that Beta and only Beta would be asked to make

a proposal. Since the differences between the two firms were not particularly striking, it is not surprising that these plausible assumptions about the attitudes of others were consistent with subsequent perceptions of the alternatives and the final recommendation.

Decision No. 4: Choosing a Data-processing System

In November, six months after the original contract had been signed, Beta submitted a report which outlined some alternative proposals designed to improve the company's accounting and merchandising procedures. Essentially three alternatives were discussed in the report: (1) a centralized electronic data-processing center employing an IBM 705 or a Remington-Rand Univac; (2) an improvement on the current procedures requiring the addition of some Electrodata equipment; and (3) an improvement on the current procedures requiring the use of punched-card electronic equipment instead of Electrodata equipment. These alternatives were differentiated on the basis of projected savings and improved management control. In each, savings were to accrue from the elimination of personnel. Management control was to be increased by additional reports, which would be more complete and more readily available.

The report shows a breakdown of the savings and reports provided under each system. A comparison of the savings for the three alternatives is shown in Table 5. The three alternatives have several significant differences. First, the decentralized system with punched-card equipment has a larger projected direct savings than either of the other alternatives ($7,515 savings for this system as opposed to $5,000 savings, and $1,455 additional cost for the other systems). Second, only when the less direct savings of $7,500 per month are added to the centralized system does this system become more attractive in price than the punched-card program. Third, the centralized system gives management six reports not provided by the other alternatives. On the other hand, the two decentralized alternatives give management four reports that are not provided by the centralized system. The centralized system has some additional advantage in that some of its reports are prepared daily. The other two systems require more time in the preparation of reports.

Table 5. Comparison of savings of alternative proposals (per month).

Factors considered	Centralized with IBM-705 or Univac	Decentralized	
		With punched cards	With Electrodata
Direct savings			
Personnel reduction (savings)	$33,000	$8,570	$8,390
Equipment added (additional cost)	26,500	1,055	9,845
Space needed (additional cost)	1,500		
Net savings (cost)	$ 5,000	$7,515	$(1,455)
Less direct savings			
a) Reduction in cost of compiling physical inventory	$ 1,500		
b) Elimination of stock record personnel (20)	6,000		
	$ 7,500		
Net savings (cost)	$12,500	$7,515	$(1,455)

Over all, there is a net advantage of two reports with the centralized system.

The savings of $7,500 a month for the centralized system noted in Table 5 are estimates for the time when the inventory is put on the machine. Since the estimates were rough and the time for converting the inventory was indefinite, no specific discounting factors were used. The consultants originally drafted a report which showed equal savings for a system using a computer and for a system which was basically a revision of the company's current practices with the addition of electronic equipment. When it was pointed out to the consultants that a recommendation was expected from them, the additional savings from converting inventory were added and the centralized system was recommended.

The implication of the foregoing should not be that cost and savings estimates were unimportant. During the six months of the consultants' investigations cost estimates played a prominent role in the analysis. For example, time and motion studies were made to derive time estimates, and the resulting estimates were closely scrutinized. Some time estimates were revised as many as three times. In the meeting of the management committee where the formal decision was made, the questions pertained primarily to costs. There was concern for the break-even point of the investment and the pay-back period.

Despite their explicit importance, however, costs entered into the decision in a way somewhat different from that anticipated by traditional theory. As in the previous cases, the first question apparently asked was whether the computer installation and/or the other installations studied would be economically *feasible*. The original report of the consultants as well as the analysis by management indicated that two of the three systems studied were feasible and preferable to the existing system. Given this basic conclusion, the use of cost data and the attitude toward that data became much more flexible than they probably would have been otherwise. Since two of the systems were defensible as replacements for the existing system, the choice between them seems to have depended less on an objective effort to assign meaningful values to intangible or uncertain advantages than on important individual preferences. Thus the controller was interested in a system that produced more information faster and with better control. He, and others, felt that the computer might become an important general managerial tool. Although they obviously felt constrained to justify the installation on comparative cost savings grounds, their attitude toward the hypothetical savings of $7,500 was undoubtedly more generous than it would have been if they had not been favorably inclined toward a computer or had not been persuaded that straightforward, tangible costs made this an "acceptable" solution.

In addition, the relation between the consulting firm and the organization points up some interesting features of the role of expectations. In this case, the organization relied on an outside source for information, but some of the behavior in the ambiguous situation of the third case also occurred here. The consultants made a detailed, careful, and responsible analysis of the proposed instal-

lations. Nevertheless, when asked to make a specific recommendation, they were able to change the summary figures on cost savings from a set that indicated indifference between two major alternatives to a set that indicated the clear superiority of the computer. The point is not that the consultants falsified their data. They clearly would have refused to do this, and the organization would not have countenanced it. But they had to make a judgment as to which uncertain costs and savings should be counted. And this judgment was almost certainly affected, as had been the earlier judgments of staff members within the organization, by their perception of management's attitudes and predilections.

DISCUSSION

The analysis of these four decisions suggests some problems with both the neoclassical conception of organizational use of expectations and some recent suggestions for revision. On balance, however, it suggests that each of the four criticisms of the conventional theory of decision making is warranted, at least in part.

Resource allocation within the firm reflects only gross comparisons of marginal advantages of alternatives. All the decisions were made within budgetary constraints and to that extent reflected any marginal calculations that entered into the formation of a general budget. When the rising estimates of costs for the crane controllers (Decision 1) and the decline of business created an internal problem of scarce resources, there were some attempts to compare the advantages of the safety devices with alternative investments. These attempts, however, focused on such considerations as prior commitment rather than marginal return.

In the other cases, there were distinct conceptions of "appropriate" costs or net return. Undoubtedly these were related in a relatively unsystematic way to the comparable statistics (e.g., "payoff period") on other acceptable alternatives. Ignoring for the moment the problem of bias in estimates, the studies indicate that rules of thumb for evaluating alternatives provide some constraints on resource allocation even though it is substantially decentralized and there is no conscious comparison of specific alternative investments. Thus a theory that predicts grotesquely

large deviations from a return on investment norm is probably not accurate.

On the other hand, it seems clear that the constraints do not guarantee very close adjustment, particularly where business conditions permit organizational slack. Any alternative that satisfies the constraints and secures suitably powerful support within the organization is likely to be adopted. This means that decision making is likely to reflect a response to local problems of apparent pressing need as much as it will reflect continuing planning on the part of the organization.

In a rough sense we can say that the first two decisions considered here arose primarily as responses to "crisis" situations, the last two as the results of planning. In the computer decisions the organization, and particularly the controller, had been alerted to the potential utility of electronic data-processing and had actually appointed a staff member to be responsible for continuing attention to possible applications. In the other cases the organization was stimulated to search for solutions to conspicuously unsatisfactory conditions. In every case, once an alternative was evoked, it was accepted if it satisfied the general cost and return constraints and enjoyed the support of key people in management. The support in turn came about through a rather complex mixture of personal, suborganizational, and general organizational goals. In Decision No. 2 the support came for mutually contraditory reasons from two or three different parts of the organization. In Decision No. 1 the support from top management came for reasons that were not directly relevant to the events that had triggered the search. In Decision No. 4 the support from top management came in considerable part from collateral expectations about the action.

Search activity is not viewed as simply another use of internal resources. In general these studies suggest that there are several stages to motivated search activity on the part of an organization. If a problem area is recognized, there is ordinarily a search for possible alternatives. At this stage only rough expectation data are used to screen obviously inappropriate actions. In each case considered here this early scanning generated only a few suitable possibilities, which were then considered in greater detail. In most

cases a rather firm commitment to an action was taken before the search for information proceeded very far, but the search became more and more intensive as the decision approached implementation. This was particularly obvious in the case of the crane controls.

One major reason why this seems to be true is that organizational "search" consists in large part in evoking from various parts of the organization considerations that are important to the individual subunits, and the relevance of such considerations, and the impetus to insist on them, are not manifest until the implications of the decision are made specific through implementation. An obvious corollary of such a conception of the search process is the proposition that search will be much more intensive where organizational slack is small than where it is large. Where there are enough excess resources in the organization, the interdependence of allocation decisions is uncertain; search consequently becomes relatively routine.

At the same time a conspicuous factor in these cases is frequently ignored in search theory. Whether in its classical form or in the level of aspiration form, the theory of search is basically a prospecting theory. It assumes that the objects of search are passive elements distributed in some fashion throughout the environment. Alternatives and information about them are obtained as a result of deliberate activities directed toward that end. Not all information comes to an organization in this way, however. Many of the events in these studies suggest a mating theory of search. Not only are organizations looking for alternatives; alternatives are also looking for organizations. In the computer decisions the intensity of search activity by the organization would scarcely have generated as much information as it did if the manufacturers of electronic data-processing equipment and the consulting firms had not been pursuing as well as pursued. In Decision No. 1, too, many efforts had presumably been made by producers of magnetic controllers to "sell" management on a change. In fact, the timing of the major spurts of activity on those decisions was as much a function of the pressure from such outside groups as it was from internal factors.

The *computations* of anticipated consequences used by the organizations seem to be quite simple. Although there is no par-

ticularly strong evidence for Shackle's specific concept of what computations are made, at most only a half-dozen criteria were used explicitly in making the decisions. There appear to be two main reasons for the simplicity. First, in one form or another the major initial question asked of a proposed action was not how it compared with other alternatives but whether it was feasible. In the decisions discussed here there were two varieties of feasibility. The first was a budgetary constraint: Is money available for the project? The second was an improvement criterion: Is the project clearly better than existing procedures? In one form or another these questions were extremely important in all of the decisions discussed here. In some cases they were rather hard to answer, but they were almost always considerably easier than the question required by the classical theory of expectations: Does the expected net return on this investment equal or exceed the expected return on all alternative investments?

The second apparent reason for simplicity in establishing decision criteria was the awkwardness of developing a single dimension on which all relevant considerations could be measured. In each of the decisions described above costs in dollars were factors; so were dollar savings. But so also were such considerations as speed and accuracy of work, safety of personnel, distance from railroad transportation, quality of performance, and reputation of company. Unless one is prepared to make explicit the dollar value of such diverse factors, and none of these firms did do so to any great extent, they must be treated substantially as independent constraints. Detailed expectations on these dimensions seemed substantially irrelevant to efforts to estimate costs because the organization had no way of using such information.

Expectations were by no means independent of such things as hopes, wishes, and the internal bargaining needs of subunits in the organization. Information about the consequences of particular courses of action in a business organization are frequently hard to obtain and of uncertain reliability. As a result, both conscious and unconscious bias in expectations is introduced. In each of the cases there is some suggestion of unconscious or semiconscious adjustment of perceptions to hopes. The initial estimates of cost for the crane controllers appear to have been fairly optimistic. The expec-

tations about the consequences of moving the Home Specialties Department seem to have been substantially a function of subunit goals. The evaluation of consulting firms seems to have shifted before detailed expectations were formed; subsequently, the expectations supported the evaluation. Expectations about net return from alternative data-processing systems apparently were influenced by some feelings of a priori preferences.

In addition, there is some evidence of more conscious manipulation of expectations. The classic statement came from a staff member involved in one of the decisions. He told a group of men outside the company: "In the final analysis, if anybody brings up an item of cost we haven't thought of, we can balance it by making another source of savings tangible."

It would be a mistake to picture the biases introduced in either of these fashions as exceptionally great. In almost every case there are some reasonably severe reality constraints on bias. But where the decision involves choice between two reasonably equal alternatives, small biases will be critical. Consequently, research on selective perception and recall is of substantial importance to an empirical theory of business decision making.

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The United States Decision to Resist Aggression in Korea: The Application of an Analytical Scheme

The following article is part of a larger effort to learn more about the character of one vital decision, to study decision making as an action process, and to test the usefulness of a particular conceptual scheme. Foreign policy decision making is regarded as a special case of decision making in complex organizations, and its methods and findings are held to be capable of general application. Two kinds of decision-making-process analyses are differentiated: organizational and intellectual. Several tentative hypotheses are derived and the basic conditions for any decision are set down. The critical role of values in structuring the decision process is illustrated.[1]

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[1]The research study of which this article is a part will be published by the Ronald Press of New York in 1959. The present article is taken from Parts 2 and 3 of the four-part monograph.

THIS is a report on one phase of a research program directed toward building a more adequate theory for the description and explanation of international relations.[2] Until the controlled interplay of empirical investigation and theoretical formulations yield the components of a general theory, it is probably best to speak of "islands of theory" developed around significant problems or clusters of phenomena. Certainly a commonly accepted focus is the making of foreign policy by individual members of the international system. There are literally hundreds of statements about the "factors" and "processes" which result in actions taken by nation-states. However, in their present form at least, these statements do not provide a broad conceptual scheme capable of identifying and connecting a limited number of key variables which can be applied to any nation-state and to a wide range of situations. Generalized models for analyzing foreign policy making have been slow to develop.[3] Case studies designed to throw light on processes and factors are few in number and have been prepared with diverse purposes, different kinds of data, varying degrees of descriptive adequacy, and largely implicit, heterogeneous conceptualization. The fact that the concept of "case" is itself subject to several interpretations is a further complication. For these reasons comparability of cases and its concomitant, generalizations which transcend cultural, institutional, and situational differences, are lacking. So far as the present writers know, there is no complete case study of a major foreign policy decision analyzed in terms of a generalized conceptual scheme. The research to be reported here should be viewed in this perspective.

PURPOSES OF THE RESEARCH

The commitment of United States military power to resist the invasion of South Korea by North Korean forces was, and is,

[2]The Graduate Program of Research and Training in International Relations, Department of Political Science, Northwestern University. This case study is one of a series to be undertaken and is closely related to organizational structure and process studies already begun in Washington.

[3]For an important effort in this direction, see Harold and Margaret Sprout, *Man-Milieu Hypotheses in the Context of International Politics* (Princeton, 1956), and "Ecological and Behavioral Models in the Analysis of State Capabilities—Considered with Special Reference to the British 'White' Paper on Defense, April 1957," a paper given at a symposium on the interrelations of behavioral and ecological models, Northwestern University, June 20–21, 1958.

regarded by former President Harry S. Truman as his most important decision. By almost any measure it was a major policy decision. To reconstruct the significant decision-making events that culminated in this history-making act is interesting and exciting. The dramatic story of what happened in the American government from Saturday night, June 24, 1950 (when officials were notified of the attack) to Friday noon, June 30, 1950 (by which time the full military commitment had been made) is the empirical core of this study. The chronological, descriptive reconstruction[4] of decision-making activities during that week is presented objectively with as much richness of detail as the available data permit.

Our study has several purposes other than mere description of how this decision was made. In addition to learning about a particular policy at a particular moment, we wished to learn more about systematic analysis of foreign policy making. We have used the occasion to test the fruitfulness of a generalized conceptual scheme and to attempt to answer two basic questions: Why was there a decision at all in this situation? Why was this decision made in response to the North Korean attack instead of some other?

Although these questions are obvious, they are not trivial. The answer to the first question is not self-evident. Not only is there a persistently advanced hypothesis about decision inertia in bureaucratic structures, especially governmental, but there is also ample evidence that observers in Washington[5] were predicting on Monday, June 26, 1950, that the United States would not undertake direct military intervention in Korea at the very time that such a decision was being taken. Reading what has been said about the decision since, one has the impression that the decision to intervene was inevitable. This was not the case. The second question goes to the heart of the problem of our eventual ability to predict, within limits, policy outcomes from a knowledge of processes. If exactly the same antecedent conditions will produce any one of several decisions, attempts at prediction are futile. But case studies of decisions made after the fact will contribute to the formulation of predictive hypotheses that can be tested in evolving situations.

[4]Whenever the term "reconstruction" is used, it refers to Glenn D. Paige, *The United States Decision to Resist Aggression in Korea—A Reconstruction of Decision-Making Events* (unpublished MS, 1956).

[5]For example, James Reston, *New York Times*, June 27, 1950, p. 5.

It is to be noted that neither question can be answered on the basis of description (i.e., what happened and how it happened) alone.

Normally, ex post facto reconstructions of policy making do not permit statements that might be judged adequate to account for the outcome of a decision-making process. Unless an observer brings in explanatory apparatus to his data, the facts, descriptive propositions, will not "speak for themselves" or suggest answers to certain "why" questions. Data must be collected, organized, and interpreted according to a priori operations. An observer not concerned with answering the two questions posed above will only accidentally provide the necessary empirical foundations for another observer to do so. No reasonably sophisticated social scientist would deny that a priori conceptualization "selects" data in some sense, nor would he deny that conceptual schemes often act as "blinders," permitting the observer to see only what he wants to see. But this fact has two sides. *If one's purpose is to account for a particular decision and if that purpose does not guide his reconstruction and inform his interpretation,* then the observer who concentrates only on the facts and rejects any explicit conceptual devices may omit pertinent data or obscure their significance.

Clearly, conceptual schemes are neither right nor wrong. They are more or less fruitful and must be judged in terms of whether they further the aims that the investigator has in mind. A scheme embodies certain assumptions about reality, and these assumptions may or may not be justified empirically. The kinds of data collected depend upon a guiding set of concepts; hence omission of available critical data indicates conceptual weakness. Hypothetical links among variables must be located or, preferably, spelled out in some detail. The ordering of data according to a priori categories should make possible the testing of both the existence and the content of hypothetical connections. Concepts must be minimally operational in the beginning or must be made so in the process of application to an empirical instance. The interpretation of findings should result in the most economical statement of the propositions that constitute an explanation of a given event. Needless to say, these rules impose serious responsibilities on an observer who is "testing" a conceptual approach.

METHODS AND PROCEDURES

Only an outline is possible of the methodology of this study. Certain procedures in the reconstruction of a major policy decision would have to be followed by any investigator: analysis of documents, memoirs, hearings, and newspapers; interviews with key decision makers when possible; and use of supplementary questionnaires. Some special problems arising from this kind of study will be discussed below, but first the general features of the conceptual scheme will be set forth.

A Decision-making Approach

We have presented elsewhere a more detailed exposition of a framework for the analysis of foreign policy decision making.[6] This framework is interdisciplinary, employing a combination of psychological and sociological variables. It regards foreign policy formation as a special case of decision making, in complex organizations generally, and is therefore capable of general application. To bridge the gap between organizational behavior theory and foreign policy formation, the following are postulated:

General Assumptions

1. Acts of a nation-state result from more or less deliberate and conscious choices by someone at some time, and a course of action is followed to serve certain purposes.
   a) The focus is on the behavior of official decision makers whose acts are authoritative so far as external relations are concerned.
   b) There is no assumption of any particular forms of rationality; the assumption of purposeful behavior excludes only purely random responses having no value base.
   c) Unconscious motivation is not excluded, but it is assumed that actions are structured by calculation of some sort at the time choices are made.

[6]See Richard C. Snyder, H. W. Bruck, and Burton Sapin, *Decision-Making as an Approach to the Study of International Politics* (Foreign Policy Analysis Series no. 3; Princeton, N.J., 1954) and R. C. Snyder, "Decision-Making as an Approach to the Analysis of Political Phenomena," in Roland Young, ed., *Approaches to the Study of Politics* (Evanston, Ill., 1958), pp. 3–38.

2. Official decision makers do not behave as discrete individuals but as participants or role players in an organizational system.
3. Nation-state action is determined by the way in which a situation is defined subjectively by those charged with the responsibility for making choices.
   a) In effect, this implies a frame of reference with the "state as a collective actor in a situation" as the core concept.

Specific Assumptions

1. Four sets of factors determine the behavior of official foreign policy makers; organizational-individual factors; internal setting factors; external setting factors; situational factors. To put it another way, foreign policy makers take into account these four sets of factors in reaching decisions.
   a) Organizational-individual factors—The total relevant institutional environment; the reservoir of persons, roles, rules, agencies, and functions from which a particular decisional unit is formed and within which it operates. The total official foreign policy organization is differentiated from organizational subsystems geared to certain tasks or handling specific problems.
   b) Internal setting—Broadly the society and culture; resources, technology, groups, elites, public opinion, mass media; the political climate; cultural values; social wants and needs.
   c) External setting—The international system; friends, allies, neutrals, enemies; international organization; diplomatic rules; bilateral and multilateral relationships; relevant internal factors in other nations; policies of other states.
   d) Situational properties—The particular event or problem to be dealt with; an occasion for decision plus its "core context" consisting of perceived variables abstracted from the total internal, external, and organizational setting.
2. The four sets of factors are interrelated. Relevant subfactors in each category must be identified, confirmed, weighted, and related by the decision makers.
3. Perceived relevant subfactors will vary from situation to situation but some aspect or aspects of each general category are

assumed to be determinants in every situation. Weightings of subfactors will differ from situation to situation.

These four interrelated categories may be regarded as the "variables" employed by the decision makers. From the makers' viewpoint these are crude indicators of the determinants of their action. From the observer's viewpoint, however, a related but different set of variables (to be discussed below) is required to describe and explain how decision makers handle their variables.

Concepts and Analytic Variables

Rather than discuss all the concepts and variables included in the general framework for decision-making analysis which we have developed, we shall mention only those central to the purposes at hand, and we shall postulate certain definitions without analyzing them in any detail:

1. *Decision making* is a sequence of activities which results in the selection of one course of action from a set of socially defined alternative courses of action intended to bring about the particular future state of affairs envisaged by the decision makers.

2. *The decision-making process* consists of (1) deliberation and calculation, specification and clarification of values, interpretations of information concerning objective events, identification and weighting of relevancies, establishment of alternatives, evaluation of probable outcomes, choice of one alternative—all leading to a "definition of the situation"; (2) a chronological flow of decision-making activities and organizational path—which decision makers acted and with what consequences—through which the intellectual process outlined in (1) is expressed.

3. *The decisional unit* is comprised of those actors responsible for making a decision in a particular situation or those actors whose decision-making activities result in a choice of a course of action—identified by the observer on the basis of the decision-making event being investigated and of the specific organizational system activated by a particular problem or situation.

4. *The organizational system* is a set of relatively fixed roles and relationships—and the activities flowing from them—characterized by repetitive, predictable behaviors, the roles and activities being bounded by a particular decision-making event.

Decision making is thus a sequence of activities resulting in choice. Process is given two meanings: the deliberative process with respect to a particular decision abstracted from the total activities engaged in by decision makers, and the organizational process —who does what, when, where, and with what consequences. Clearly there are several important aspects of decision making aside from deliberation, and deliberation itself has multiple aspects.[7] And there are other meanings of process.[8] Since this study is primarily concerned with what might be called intellectual process analysis and with the chronological flow of major decision-making activities, these two particular concepts of process are stressed.

Three Major Variables

Let us assume that the decision makers have been identified and that the organizational unit has been determined. What kind of data on the decision makers and their activities is to be collected? Three variables, or rather sets of variables, provide guidance: organizational roles and relations, communication and information and motivation. Our basic assumption is that if a sufficient number of factual propositions on the behaviors and activities implied by these variables can be established, the interrelations of the three sets of propositions become the empirical foundation for an explanation of a decision. A necessary step toward this is to convert the straightforward historical reconstruction of decision-making activities into a descriptive analysis, i.e., a description of what happened in terms of the major variables. In other words, wherever there is complex organizational decision making, these three sets of conditions must exist and will be related in their impact on decision making. Furthermore, the most economical method of isolating the key empirical propositions is to categorize the data according to which of these three variables is predominantly involved. The three categories of analytic variables generate a series of questions which both select and organize the data. A

[7] At a very general level: (1) decision-making organism, (2) decisional environment, (3) occasion for decision, (4) deliberation, (5) decision, (6) outcome, (7) path of action and feedback. Though unexplicated here, these analytic components offer a basis for specifying the range of phenomena implied by the term "decision making."

[8] I.e., (1) deliberative process, (2) sequential process—chronological event flow and organizational history, (3) interaction process, (4) choice-mechanism process, (5) influence process. These are, of course, interrelated and all five "processes" operate in the over-all decision-making process in actual situations.

detailed exposition of these variables has been presented elsewhere.[9]

In the analysis[10] of the reconstruction of decision-making events, we have identified some 42 basic specific propositions (organizational variable = 7; informational variable = 20; and motivational variable = 15) and interspersed them with an analytic description of decision-making activities. Since only 42 have been drawn from a long, detailed account, it is apparent that each represents an abstraction from many descriptive statements. A sample is presented below so that the reader may have some idea of the analytic technique:

Organization

Specific proposition no. 2: The number of organizational agencies and roles which were incorporated in the decision-making process was relatively small.

Specific proposition no. 5: The President's leadership was the key factor in defining and stabilizing the authority structure.

Specific proposition no. 7: The organizational custom of presenting unanimous recommendations to the President tended to limit the area of disagreement.

Information

Specific proposition no. 1: Limited information did not prevent an initial definition of the situation which included elements beyond the objective situation per se.

Specific proposition no. 2: Limited information did not prevent a decision to keep the invasion from succeeding.

Specific proposition no. 9: The decision makers were not subject to competing or conflicting information that seriously affected their deliberations.

Motivation

Specific proposition no. 1: Initial evaluation of the seriousness of the event resulted in the imputation of a high degree of requiredness to the situation.

[9]See Snyder, Bruck, and Sapin, *op. cit.*, and Snyder, *op. cit.*, for a more detailed exposition.

[10]All future references to specific propositions and general hypotheses are to Richard C. Snyder, *An Analysis of Case Materials on the U.S. Decision to Resist Aggression in Korea* (Palo Alto, 1957).

Specific proposition no. 3: There was a will to act among the decision makers, and there were means at hand to make a positive response possible.

Specific proposition no. 12: Differences among the decision makers with respect to relative orderings of values and situational relevancies did not prevent, or alter in any basic way, the sequential definitions of the situation because such differences did not have to be reconciled and were completely overshadowed by the cruciality of shared orientations.

From these three categories we have developed a master list of basic questions to be asked in any organizational decision, in addition to the specific questions which we asked the Korean decision makers in interviews, reinterviews, and written follow-up questionnaires. All other evidence in the case has been searched with questions pertaining to organization, information, and motivation in mind.

In sum, we have postulated that organizational decision making consists of a sequence of activities carried on by members of a unit whose behavior is determined by *structural factors* (role differentiation, authority relations, a set of rules, and a communications network—both internal and external to the unit), by *certain kinds of information* possessed by individual members or provided by the structure, and by *individual shared motivational factors* (values, attitudes, cognition, and perception). The psychological and sociological levels are joined, and there are implied interrelations among the three sets of variables. Illustrations of the latter point follow: (1) organizational roles partially determine who will decide and hence whose values, attitudes, and perceptions will be crucial; (2) values, attitudes, and perceptions will partially determine the selection and interpretation of information; (3) the organizational structure will partially determine the communications network.

To revert to the decision makers' variables—the factors in the overlapping settings and concrete situation which must be reckoned with—we feel that the questions we ask will yield data which will reveal these factors and that the hypothetical links among the observer's variables will point to the interrelations of the decision makers' variables and to the consequences of this for a decision

taken. Our information variable, for example, cues us to all the factual elements that bear on a decision and to the way various information elements are selected and calculated. Factual elements may be additive, unrelatable, or self-canceling so far as the decision makers are concerned. Above all, it is the impact of information on other components which is significant, and there is no method of analyzing this except by relating organizational and motivational factors to information.

SOME METHODOLOGICAL PROBLEMS

It will occur to the reader that reconstruction of a major policy decision is difficult enough without attempting to apply a complex conceptual scheme. Certain difficulties have already been suggested. We shall discuss only a limited number of problems here, and only in the context of the Korean study. As we proceed we shall try to suggest various lessons we have learned.

Adequacy of Data

One of the perils of writing recent history is that pertinent materials are usually not available to scholars until long after the event. We were very fortunate in that a reputable journalist had had access to Presidential papers and had interviewed participants not too long after the period of decision. We ourselves received full co-operation from the key decision makers, who were not only willing to be reinterviewed but to read and comment on our draft reconstruction of the week's activities. The absence of serious disagreements or jurisdictional disputes, plus the conviction of the decision makers that the decision was the correct one, undoubtedly enhanced the willingness of respondents to talk freely. While we were not allowed to examine highly classified documents, the Historical Research Division of the State Department did examine these documents in order to answer our questions. We were also provided with an official chronology. Memoirs, notably the former President's two-volume work, have since been published. Supplementary appropriation hearings and the hearings held on the removal of General MacArthur offered a wealth of data. Everything considered, we feel we have more than sufficient data for our purposes. So far as we can tell—and we are reassured by the deci-

sion-makers themselves—we have neither significantly distorted the record nor omitted any data that might alter our reconstruction or analysis in important respects. Of course, only a later study based on direct access to classified materials will confirm this.

On the other hand, data which would permit a blow-by-blow account and analysis of face-to-face and non-face-to-face interactions among the decision makers are lacking. This is, then, a round-by-round account, not an interaction-process analysis. The complete network of communications cannot be reconstructed, though the data to describe information sources and flows are available. With a day-by-day reconstruction which is fairly rich in detail but not a complete organizational history, we are limited to an "intellectual process" plus a partial "organizational process" type of decision-making case study. However, the data are adequate for analysis of the organizational variable and its effect on decision making. Although we can assess personality factors, we cannot reconstruct interpersonal relations during the decision period and we have not attempted to investigate fully the knowledge, skills, and theories of the decision makers or their social backgrounds. These data limitations do not mean, however, that we are unable to answer the two basic questions posed earlier.

Memory

No one denies that human memory is fallible and selective. This is a fact scholars must live with. Several strategies, available in most public policy cases, have been employed to deal with this problem. In the first place, the submission of a draft reconstruction of a decision-making event to the participants may be a more effective way of recalling facts than the interview or questionnaire, for the reason that occurrences are put in correct order, thus outlining a chronological skeleton of significant developments, and that occurrences are placed in a richer context, thus providing a larger sample of possible associations. Second, there is an official record—a chronology, as well as other documents—to which limited access was possible, thus providing a check. Third, we found newspaper accounts of the time exceedingly valuable—more valuable than we had previously thought and on the whole highly accurate in the light of later evidence. Evidence from a number of newspapers

must, of course, be pooled and evaluated in the light of other evidence, but our experience has led us to believe that such evidence is extremely useful.[11] Fourth, some of the most pertinent data are based on the direct testimony in official hearings of those involved in the decision within a relatively short time after the week of June 24–30, 1950—notably the summer of 1950 and the spring of 1951. Fifth, several of our key respondents kept diaries which they consulted in response to our questions. One of the most important decision makers, Ambassador Philip C. Jessup, actually kept "minutes" of the crucial Sunday night, June 25, meeting of the decision-making group. Sixth, close questioning of all the important decision makers gave us a list of "memory" checks which could be followed up in reinterviews and questionnaires as well as some idea of those whose memory might be trusted on specific points.

Fortunately, on major points we had no head-on inconsistencies to resolve. An extremely important condition in our favor was the absence of any really significant disagreements which might add a very selective dimension to individual memories. Furthermore, it is a well-known hypothesis in psychology that when there is marked satisfaction with a past decision or with past conduct, the scope and accuracy of memory is facilitated. There is partial confirmation of this hypothesis in the present case. To this day all the decision makers feel this was a right decision.

Rationalization ex post facto is a familiar phenomenon in historical reconstruction, especially when memoirs or interviews are employed. It may take two forms: first, reinterpretation of what happened; and, second, reinterpretation of why it happened. The problem posed by the former is essentially no different from verification of any occurrence. The second form is more ambiguous, although it too has a factual component. Suppose the reasons for a decision given at the time, whether revealed publicly or not, are different from the reasons given years later? If the two sets of

[11]Our findings on this point have been in harmony with and have tended to substantiate further the earlier conclusion of Alexander L. George that "a surprising amount of reliable information about American policy calculations can be obtained from the columns of the better metropolitan dailies." See his "American Policy-Making and the North Korean Aggression," *World Politics*, 7 (Jan. 1955), 210.

reasons can be separated, it is our contention that the original ones are pertinent to the reconstruction and the analysis, but that later reasons, though interesting, are irrelevant. If data on the original reasons are lacking, that is a different problem. When later memory must be relied upon for evidence of original reasons, special care must be exercised in reconstructing them. Again, one aid is inter-subjective comparison. The observer is foolish who inquires whether the original reasons given were in fact the "real" ones. To repeat, the reasons for a decision given by the participants are not sufficient to explain why a particular decision was made. Provided evidence of the relevant values and other data are available, the decision can be accounted for, regardless of reasons advanced by the decision makers.

Suppose, for example, that the "real" yet unexpressed reason for the strong, positive response to the North Korean invasion was the prevailing domestic political climate, one component of which was the oft-repeated charge that the administration was "soft" on communism and that officials had "sold out" in China. This involves guessing on the part of the observer—inferences drawn by him from his interpretation of the political climate and his interpretation of how decision makers must or should behave under such conditions. It also involves a string of untestable assumptions. On the other hand, analysis of verified facts justifies an explanation of decision-making behavior based on a descriptive portrait of the way things looked to the participants. Both, of course, are consistent with the outcome. The explanation to be preferred is the one which rests on sound empirical foundations.

Problems of Application of a Conceptual Scheme

Quite apart from problems of data adequacy and memory and from an evaluation of a conceptual scheme in terms of criteria of logic, there are difficulties of application to a particular set of events. Beginning with highly generalized definitions, assumptions, and variables, there are a whole series of logical extensions and operational procedures required to bring a scheme "closer" to the data for purposes of collection and organization. When the data have been assembled and categorized, the task of interpretation requires further adjustive operations moving from data

back to the conceptual scheme. For example, our exposition of the organization variable (or, indeed, of the other two major variables) did not, in its first crude presentation, set forth a *leadership function*. If the scheme had been logically extended a priori, this subconcept should have been specified. Since we became involved in researching the decision before refinements in the scheme had been formally accomplished, the process of data interpretation suggested, ex post facto, what some of the refinements ought to be. Working backward in this fashion has the advantage that additional specifications are directly implied by concrete findings and not by hypothetical thinking *in vacuo* or by impressions from scattered and incomplete data. It has disadvantages arising from the limitations of the single case and from imprisonment at a lower level of generality. To return to the leadership function, the following general properties emerge:

1. Ultimately the leadership function (or, really, a set of functions) is implied by, and/or flows from the exercise of role prerogatives and level of authority.

1a. There are several kinds of leadership functions having direct effect upon organizational, informational, and motivational variables.

1b. Leadership, at the most general level, appears to be not only an independent variable, but a dependent variable determined by organizational structure (group properties and interaction), personality characteristics, and situational components.

To illustrate the latter point, we shall outline the leadership functions performed by former President Truman and former Secretary of State Acheson as they appear from our data, viewing each set of functions as both dependent and independent variables.

1. *President Truman's leadership*

a) As a dependent variable. His leadership was a function of role prescriptions and his interpretation of these prescriptions, of the nature of the decision-making group, and of the situation:

1) The President had to decide; no one else could validate the decision.

2) The President had to co-ordinate jurisdictions and views when necessary.
3) The President had to structure his authority relations.
4) The "crisis" nature of the situation and the "range of response possibilities" meant that the President's unique responsibilities and power would be involved.
5) The decision-making group consisted of delegated operating roles and staff roles—advisers and implementers of policy choices.

b) As an independent variable. President Truman's leadership was relevant for:

1) The choice of participants in decision-making groups—particularly the *ad hoc* Blair House conferences of Sunday night (June 25) and Monday night (June 26)—trusted as well as technically necessary because of the problem at hand.
2) The role structure of his advisers (i.e., the whole decision-making group except the President) in terms of (a) genuine solicitation of ideas and (b) requests for individual approval or disapproval or recommendations.
3) The specification of relevant values—notably preservation and strengthening of the United Nations.
4) The validation of, and acceptance of full responsibility for, a momentous course of action.
5) The assignment of roles within the decision-making group, notably the designation of Secretary of State Acheson as the drafter of recommended actions.
6) The provision of an "historical context" for the objective situation to be dealt with—a sense of historical perspective.
7) The determination of choice-making procedure—Quaker-meeting consensus plus individual oral responses to proposed actions.
8) The creation of a pervasive atmosphere of "resolve" and "determination."

2. *Secretary of State Acheson's Leadership*

a) As a dependent variable. His leadership was a function of:

1) His prescribed role as Secretary of State—both internal to the Department of State and vis-à-vis other agencies (i.e., "first among equals").
2) Specific assignment by the President to draft key recommendations.

b) As an independent variable. His leadership was relevant for:
1) The drafting of recommendations for military intervention discussed at the June 26 Blair House conference.
2) The assumption of initiative for the formulation of the initial responses to the news of the North Korean invasion when it was received Saturday, June 24.
3) The specification of relevant values, notably the whole collective security system built up since World War II.

Obviously the foregoing does not indicate the whole leadership function manifest during the week, but it does point up crucial aspects which helped shape the decision and the decision-making process. It is worthy of note that we have here illustration and limited confirmation of the validity of Bales's familiar distinction between "charismatic" and "idea" leadership or leadership roles.[12] Truman inspired his advisers and created an interpersonal relationship between himself and them, and among them, which helped to structure both process and outcome. Acheson provided central proposals—ideas upon which discussion centered.

Of the different strategies which might be chosen by a leader to structure group decision making, the President chose to ask for recommendations, which were then reacted to by the group, rather than to present his own proposals for discussion or to hold back his own proposals until the group had reached its consensus first. As already mentioned, the decision makers were unanimously satisfied with the group choice, though we are unable to make any statements about the significance of the mode of leadership for the satisfaction felt.

Another problem of application resulted from the earlier formulation of the motivational variable. When we began our study of the Korean decision, we had a general definition of motivation and

[12]See, for example, Robert F. Bales, *Interaction Process Analysis* (Cambridge, Mass., 1950).

some notions as to the kinds of data which would provide a basis for motivational statements. In addition, we had postulated the concept of "definition of the situation of action"—a familiar and explicitly or implicitly accepted notion. This concept was not, however, operational as formulated because there were no clear guide lines for coding data in terms of it. Nor, surprisingly, did the literature contain such operational rules. One of our tasks was to make the concept of definition of the situation into a useful tool for organizing and interpreting data in this case. By working back and forth between the concept and the data, we arrived at the following five component elements of the definition of the situation: (1) categorization of an event in terms of past experience and existing "givens"; (2) specification and clarification of generalized values and the bearing of the objective situation on them; (3) perceived relevancies—factual aspects "added to" the objective situation; (4) establishment of a set of goals—a desired state of affairs to be attained; and (5) assessment and selection of one combination of available means and desired goals.

This formulation has several advantages. First, it is relatively easy to code data once it is collected. Second, it can be applied to a group even though motivation is essentially an individual concept. That is, points of consensus and disagreement can be established if the data permit so that statements can be made reflecting the group definition of the situation. Third, it clarifies the empirical components of the "intellectual process" of decision. Fourth, it suggests a multiplicity of elements which are and must be interrelated; no one or two elements are sufficient to account for the way a particular situation is defined. Neither values nor objective events are sufficient. An obvious example is that available means will often determine what goals can be pursued.

One ever-present problem is the possibility that a conceptual scheme will imprison the observer, allowing him to see only what the scheme directs him to see and ruling out other interpretations of data. It is readily admitted that this danger is implicit in all a priori thinking. Ordinarily it is the historian who issues this warning. To be noted first is the fact that Eric Goldman in his excellent account of the Korean decision omitted the important fact that the United States decision makers overestimated the

resistance capacity of the R.O.K. army and underestimated the military strength of the North Korean forces.[13] This is precisely the kind of data our scheme would highlight. In all fairness to Goldman it ought to be said that he devotes only a single chapter to the whole episode and that his purposes probably did not include an attempt to answer the "why" questions we posed for ourselves. At any rate, the point is that selectivity is not peculiar to applied theory constructed in advance of an investigation. However, to guard against any inherent bias of selectivity in our analytic apparatus, we have also engaged in normal "historical sleuthing." That is, we have used an empirical event as our focus and have worked outward from this, following whatever leads were uncovered. Beginning with the time of the actual invasion by North Korean forces (Saturday, June 24, 3 P.M., EDT) and ending with the President's announcement of the commitment of "certain supporting ground units" Friday noon, June 30, we have attempted to include all relevant actors and data—in short, any facts which had to do with the invasion and the response to it during a specified time period. Thus we have combined application of a conceptual framework with historical reconstruction in the manner of a good historian or reporter. Furthermore, we have consciously played one against the other. Conventional history yields an explanatory "what" and social science theorizing can produce a rigorous "why" explanation.

To summarize, we have four interlocking devices to guide our data collections: (1) what was said and done by those associated with a clearly defined week-long event; (2) a set of questions generated by our conceptual scheme; (3) factual chains which develop as the answer to one question leads to still other questions; and (4) an unstructured interview technique which is designed to let the participants recount what they felt was important. The "blinder effect" of item no. 2 was counterbalanced by the other items as safeguards.

Parsimony

Economy in the collection of data and in explanatory mechanisms is a canon of scientific analysis. A comprehensive scheme may

[13] *The Crucial Decade: America 1945–55* (New York, 1956).

lead to unnecessary operations and to overanalysis. As noted above, parsimony results from constant testing and refinement. If one must err, it ought initially to be on the side of overelaboration of categories which can be eliminated after empirical investigation demonstrates the need to do so. The allegation that a conceptual scheme requires "too much knowledge" on the part of the observer has one tentative reply: Too much for what or in what sense? If it is a matter of not having access to data, we are back to an issue already discussed. If it is a matter of the purposes of the analyst, the question is whether the purposes must be changed or whether another scheme will achieve the same end more efficiently. The latter is something to be determined by experimentation.

We hope we have achieved some parsimony without sacrificing adequacy of explanation or without making too many untested assumptions. In the Korean case we have formulated 17 specific empirical propositions linking the three variables which, tentatively, we feel account for what was done and why. Now it must be emphasized that this is not the equivalent of saying 17 factors (variables) entered into the decision. For one thing the propositions link pairs of variables. For another, the same variable may, and does, appear in more than one proposition. Moreover, when we consider the specific empirical propositions abstracted from the reconstruction under each variable there are only 42 altogether. This stands in contrast to the hundreds of lower-order descriptive statements that comprise the reconstruction.

We hope also that we have developed means for cutting through the excess detail, the long narrative, to identify the "core" of the decision—the basic alternatives and calculations abstracted from descriptive statements and given explanatory interpretations. Naturally this does not include everything said about the event, nor does it "explain" the explanation in terms of factors unstated in the core analysis. Again, parsimony is related to purpose.

The Problem of the Single Case

This is a persistent source of difficulty for the social scientist: breadth versus depth, generalization versus the bases (number of instances) on which generalization rests. In comparison with many so-called case studies, we have a study in depth; our work is closer

to the scope of T. M. French's *Integration of Behavior* (two volumes on a single personality) than to the studies used by the Harvard Business School. Clearly, however, we do not have the degree of depth manifest in French's work. It is commonly asserted that the greater the depth, the more restricted the individual case becomes; i.e., it is less comparable to other cases. Leaving aside different conceptions of what a "case" is, the single case does raise the problem of comparability as well as that of generalization. Comparability requires an *n*-number of things to compare and a set of generalized aspects or categories which attribute common properties to the *n*-number of objects or which derive from them. Generalization rests on comparability.

We are well aware of the limitations of the single case. Nevertheless, depth study of a single event or sequence of events is a distinct advantage to the observer who wishes to perfect a scheme of analysis. No one can learn what data can be "thrown away" until he has some idea of what the sum total of data is like. On the other hand, it is agreed that the analytic aspects of an object cannot be exhausted, and empirically it is also improbable that we can be exhaustive. But the greater the depth of analysis, the more one can learn.

There are some means for overcoming single-case limitations. First, an effort can be made to formulate hypotheses from the data in a specific case which have more general applicability and which can be tested in other (though different cases). To this end, we have derived some forty general hypotheses which we shall test in succeeding studies. Second, the outstanding empirical characteristics of the Korean decision presented below suggest the need for typologies, among them types of decisions, types of decision-making roles, types of decisional units, types of objectives, and types of situations. Preliminary work along these lines has already been done.

A sample of general hypotheses follows. Needless to say, we make no claim at this stage as to their empirical or logical status; they appear interesting and fruitful to us at the moment. No attempt will be made to specify the conditions under which the hypotheses will hold true.

Hypothesis 11: The greater the urgency and the shorter the decision time, the fewer are the number of significantly differentiated alternatives.

Hypothesis 15: If authoritative sources of information are, in effect, reduced to one, the greater is the influence of that source on the definition of the situation.

Hypothesis 16: The shorter the decision period, the less thorough is a search for information within the communication system likely to be.

Hypothesis 17: Initial responses to serious but ambiguous situations are more likely to be positive when a response is available which does not foreclose subsequent alternatives.

Hypothesis 23: It is possible to infer from a decision the relation between degrees of preference for possible outcomes and degrees of belief in the probability of possible outcomes.

Hypothesis 29: The stronger the value components (i.e., motive strength) activated by a situation, the less likely is insufficient information to prevent a decision.

Hypothesis 35: Overt value decisions will be made only at the highest level of an organizational hierarchy.

Hypothesis 40: When crucial choices are forced on an organization from the environment, the decisional subsystem will be characterized by smaller decisional units and a simpler role structure.

We expect also to derive general hypotheses from the 17 empirical propositions which link the three variables. For example, from specific proposition no. 1 under information and motivation an interesting hypothesis is: the higher the decision makers are in the organizational hierarchy, the more likely are they to be their own source of information with respect to "perceived relevancies" which are "added to" the objective situation.

The Problem of Objectifying the Reconstruction of Decision-making Events

In order to reconstruct the week of decision making from the subjective standpoint of the policy makers and to report only verified factual events, it is extremely important to prevent the intrusion of the observer's judgments and speculations. Clearly

this is not an easy task, and complete objectivity is perhaps not possible. One habit that can be acquired with sinister ease is the connection of simultaneous events which are not so connected in the minds of decision makers but which are logically connected, or ought to have been connected, according to the observer. To facilitate decontamination of the reconstruction we have deliberately separated the reconstruction from the analysis. There is a similar observer-actor dilemma with respect to the presentation of the background of the decision, but we shall forgo comment on that here. In addition to separating the account of decision-making events and the analysis of those events, we have formulated a set of rules for deciding on the inclusion of statements in the former.

By separating events into predecisional (prior to 3 P.M., EDT, Saturday, June 24, 1950), decisional (3 P.M., Saturday, June 24 to 12 noon, Friday, June 30, 1950), and postdecisional (after 12 noon, June 30, 1950) periods, it is possible to preserve not only the proper chronology but to isolate those events central to our purposes. We do not attempt to report or account for events not in the decisional period. Events of the decisional period are confined to statements of things done and said by those in one way or another involved in the Korean situation and in the decision-making activities—the decision makers, their advisers, newspapers, other governments, the military, and so on. Such statements may be confined to a single fact: e.g., Truman read the usual four newspapers he always read on Monday morning, June 26. Or a statement may reveal what the President was thinking about the problem that morning. Or a statement may summarize what the editorials said at that time. Finally, a statement may include both the President's thought and the editorial content and still be a factual statement. But it is not a statement of fact to infer any causal link between the two facts unless actually warranted by the evidence. Hence in the absence of further evidence a statement: "The President was undoubtedly influenced by what he read in the editorials" is not fact but speculation.

There are three kinds of connecting statements which ought to be distinguished:

1. Chronological linkage. On Saturday it was decided to proceed

in a certain way through the UN and on Sunday an emergency meeting of the UN Security Council was requested.

2. Causal linkage (when verified). The President was not influenced by what he read in the newspapers Monday morning though he was interested to see what was being said; or the United States decided to proceed through the UN because "it was a positive course of action which would not commit the U. S. prematurely to a given course of action."
3. Linkage of simultaneous events. On Sunday, when the decision makers were discussing what should be done, the North Korean forces were advancing rapidly. (This was not known in detail at the time.)

Statements of a causal variety (2) are excluded from the reconstruction and confined to the analysis. Nevertheless, explanatory statements made by the decision makers concerning their behavior at the time are included in the former. To ensure further that unwarranted interpretations, queries, and judgmental statements are kept in their proper place, we have divided both the observer's interpretations and subjective views of the decision makers prevailing at the time into predecisional, decisional, and post decisional categories. We have also been explicit about the time when evidence is established in order to insulate hindsight from a description of the state of affairs during the period of decision making. For example:

Predecisional period (Prior to June 24)	*Decisional period* (June 24–June 30)	*Postdecisional period* (After June 30)	*Analysis* (Ex post facto)
I. Actual absolute and relative military strength of North and South Korean forces	II. Actual estimates of decision makers; what they thought and/or knew at the time	III. How relation between I and II turned out	IV A. Descriptive: Discrepancy between I and II
A. Known accurately to somebody at the time	A. Statements made during the decisional period about the predecisional period	A. Decision makers and observer ex post facto	B. Explanatory: Effect of II on the decision
B. Later established by (1) decision makers and (2) observer		B. Statements made by decision makers and others (pertaining to the actual state of affairs during I and during II)	
Background (includes II A when verified; includes also III B)	*Reconstruction* (includes III B)		*Analysis* (includes III A)

Implications are queries not necessarily answered by descriptive reconstruction or analysis when these are confined to actors' behavior. Why the discrepancy between I and II? (This can be answered factually but it has nothing to do with question IV B). Why were the South Koreans not better armed? (This too can be answered factually but has nothing to do with the answer to question IV B) The kinds of questions raised under the heading of implications are interesting and pertinent, but neither the questions nor the ex post facto judgmental or factual answers made to them by the observer belong in the background, the reconstruction, or the analysis (which is confined to attempts to explain the behavior of decision makers). It is perfectly true that if the estimates of II had been different, the course of decision making would have been different, and hence statements under IV would be different. It is one thing to say that the decision makers acted as they did because they underestimated the strength of the North Koreans forces; from the point of view of interpreting how the situation looked to the decision makers, this is hindsight. It is another thing to say that the decision makers acted as they did because they estimated the strength of the North Koreans in a certain way; this is an accurate portrayal of the existing state of affairs from the decision makers' perspective. Statements of this sort belong only in the analysis, but it is significant to note that the latter does not require hindsight. Theoretically, the latter statement could be made without accurate knowledge of conditions under I. The judgmental statement depends on such knowledge. The former inference can be drawn solely from evidence of the prevailing state of affairs under II; the latter cannot. Both are justified if the evidence is complete enough to sustain both. The "why" questions posed above require additional evidence and arise out of the reconstruction of the decision but are not part of it.

Our concern with the foregoing distinctions arises from the fact that in many reconstructions confusion between the observer's and actors' perspectives and between factual statements and interpretive or judgmental statements abound. It is proper for the observer to make statements in the reconstruction which juxtapose two facts or events—even where the decision makers were not aware of simultaneous occurrences so long as no causal imputation

is implied or made explicit. It is not proper for the observer to add to the reconstruction such statements as: The decision makers underestimated the strength of the North Korean forces. This is a fact, but it is, so to speak, a postdecisional fact. The observer can, however, present evidence of the actual relative strengths on the eve of the decision (the background) so long as in recounting the events of the decision period he includes only statements made by the decision makers or statements which faithfully reflect their momentary calculations regardless of the objective situation in Korea. Perhaps the whole point here is that explanation and what is being explained must be kept separate. They must be separated because explanations bound up with a narrative are often passed off as facts when in reality they are hypothetical links between facts which rest on grounds other than the truth or falsity of the facts being linked.

MAJOR EMPIRICAL CHARACTERISTICS OF THE KOREAN DECISION

It will be useful to provide a bird's eye view of this decision through a series of characterizations directly suggested by the data.

1. This was a major or crucial decision in view of the cost in money and lives, and of the impact on existing plans and policies.

2. The decision time was unusually short for a major decision, and the degree of urgency was high—i.e., it was a crisis decision.

3. The necessity for decision was thrust upon the decision makers by a change in the environment and not spontaneously induced from within the total foreign-policy-making organization.

4. The occasion for decision was one of surprise.

5. This was a positive action decision, not a policy decision (in the sense of establishing rules for meeting future contingencies).

6. This was an unprogrammed decision. There was no plan for dealing with the exigency which arose.

7. Only a small number of clearly identifiable decision makers were involved—at the most 14, and even fewer if the core group of 8 or 9 who were members of the key decisional units throughout the week are counted.

8. It was a high-level decision in that all the effective decision

makers were of the rank of assistant secretary or higher, if civilian; or were service chiefs, if military.

9. The Korean decision had a short, relatively simple organizational history.

10. Taken as a whole, the decision was irrevocable in the sense that once the chosen course of action was embarked upon, there was little room for "adaptive interpretation," which might have made goals less ambitious and means less costly.

11. The decision did not represent goal setting in a structured environment but rather an adaptive response to a new situation.

12. The decision was an integrated decision not a compromised decision: the action taken served several compatible values and did not require the partial satisfaction of two or more incompatible values.

These characteristics not only throw some light on the nature of the Korean decision, but taken together they constitute a description of its unique features. How often would these characteristics be repeated? How can one generalize on this basis? We have already mentioned the need for typologies and for deriving general hypotheses from the single case which can be tested in subsequent cases. The reader will note that the twelve characteristics imply typical dimensions: the nature of the occasion for decision, cruciality, lack of a pre-existing plan (unprogrammed), duration of the decision period, location in the organizational hierarchy, the distinction between policy as action and policy as rules, and so on. Most of the characteristics mentioned would be dimensions of decision, decisional unit, and situation types. To render the Korean decision comparable, the crude empirical characteristics must be located in a classification scheme applicable to a wide range of decisions.

In our analysis of the case we have derived general hypotheses from the foregoing statements, for example:

Characteristic 4: General hypothesis. Surprise creates initial vacuum in the deliberative process in which the evaluation of the significance of an event precedes the full unfolding of the event.

Characteristic 2: General hypothesis. The shorter the decision time, the fewer the alternatives which will be considered, and the

less extensive an estimate of multiple outcomes attached to particular courses of action.

Characteristic 12: General hypothesis. Situations defined as having a very high degree of threat and as indicating direct action, tend to result in integrated decisions.

These hypotheses, and others set forth above, need explication and, in some sense, justification. In short, they are not completely self-explanatory and they need a context. We have attempted to do so elsewhere. Here we shall simply repeat that the testing of hypotheses of this sort ought to advance our knowledge of what kinds of determining factors are associated with what kinds of decisional outcomes.

The Structure of the Korean Decision

From our analysis it would appear that an outstanding characteristic of the Korean decision is its sequential nature. From Saturday night, June 24 (the occasion for decision) to Friday, June 30, a series of choice points occurred. The Korean decision is really a set of decisions which were not made at one point in time. One way to view the structure of the decision is as a series of related but analytically separable sequences: (1) a sequence of choices at successive stages; (2) a sequence of decisional units; (3) a sequential flow of information; and (4) a sequence of definitions of the situation. All four fall naturally into eight stages. There are nine separate decisions and nine decisional units.

A brief indication of what was decided and when can be embodied in an outline as follows:

Stage I, Saturday: Decision 1. (a) To respond positively and (b) to respond in a particular way through the UN (request an emergency meeting of the Security Council and present a resolution stating that an act of aggression had taken place).

Stage II, Sunday: Decision 2. (a) Not to permit the invasion to succeed; (b) to evacuate American citizens from South Korea; (c) to send additional arms and ammunition to the South Koreans; (d) to move the 7th Fleet northward from the Philippines.

Stage III, Monday: Decision 3. (a) To commit American naval and air units in direct combat support of the ROK army south of the 38th parallel; (b) to guarantee the neutrality of Formosa by

interposition of the 7th Fleet; (c) to increase military aid to the Philippines; (d) to accelerate military aid to French Indochina; and (e) not to use ground forces in direct combat at this time.

Stage IV, Tuesday: Decision 4. To send a note to the Soviet Union asking that the Soviet government disavow responsibility for the attack and use its influence to have North Korean forces withdrawn.

Stage IV (cont.): Decision 5. To introduce a second UN resolution calling upon all members to give military aid to South Korea.

Stage V, Wednesday: Decision 6. To extend American air and naval action north of the 38th parallel.

Stage VI, Thursday: Decision 7. (a) To restrict use of ground troops to protection of supply lines and evacuation of citizens; (b) to restrict American air and naval action to purely military targets north of the 38th parallel; (c) to order air and naval units to stay clear of Soviet and Chinese borders.

Stage VII, Friday (early morning): Decision 8. To permit General MacArthur to use one regimental combat team in resisting the invader.

Stage VIII, Friday (late morning): Decision 9. To authorize General MacArthur to use all troops under his command at his discretion.

Several points should be noted. This outline represents an abstraction from many, many activities. It is a deliberate simplification for the purpose of laying bare the logical and chronological highlights. However, these stages do not reveal and cannot reveal when the individual decision makers made up their minds. What is revealed is the time when group opinion coalesced and was made official and the content of the decisions. Nor can we say that all the decision makers actually experienced the decision-making process as a series of clearly marked stages, although some did. However, the data shows that some decisions were made before others, that some stand in an implementary relationship to others, and that some were more significant than others. As can be readily seen, one developmental trend was the progressive enlargement of the American military commitment.

The nine decisions above (from occasion to full commitment

of the armed forces) can be viewed as a single event with the time sequence collapsed. For some purposes this is the most appropriate view. Empirically, decision 3 seems to be the core choice because it determined the fundamental character of the response to the situation. Nonetheless, it is also strongly suggested by the data that decision 2 was a necessary prerequisite to direct military action. Finally, it is equally appropriate to say that the Korean decision did not emerge completely until ground troops were committed because this made involvement considerably more "warlike." Now if decision 2 was logically prior to decision 3 (as well as chronologically prior), decision 3 cannot be regarded as the only choice which would have been consistent with decision 2. And though decision 9 would hardly have been likely without decision 3, the former is not fully determined by the latter.

These statements represent different but equally useful perspectives on the decision. Argument over when the decision was really made or which statement identifies the real decision is fruitless without the qualifications noted and unnecessary if these qualifications are accepted.

Sequence of Definitions of the Situation

Space does not permit us to reproduce our analysis of the evolution of definitions of the situation and the emergent goal structure associated with various stages and decisional units. Rather we shall present first an overview of major general elements in the definition of the situation shared by the decision makers and which prevailed throughout stages II–VIII. These elements were as follows: (1) requiredness, the necessity and urgency to act directly and positively; (2) political challenge (presented by an event characterized as an act of aggression), short-run prestige and "blackmail," with long-run threat of another world war, which could not be ignored; (3) belief in the likelihood of "limited conflict," odds good, cost unknown; (4) calculated risk of all-out war if the U.S. intervened; (5) assumed probability that China and the Soviet Union would not directly intervene if the U.S. did so; (6) overestimation of South Korean strength and underestimation of North Korean strength.

At stage I the definition of the situation included the element of requiredness, but the choices were also made in terms of its being

"natural" to proceed through the UN, the need to buy time without foreclosing other alternatives, and the mobilization of collective support for future action. At stage II the consequences of a successful North Korean invasion were found to be intolerable and certain "routine" measures were taken; yet not enough was known about the objective situation to justify consideration of specific courses of action. At stage III it was felt that the commitment of American naval and air units would be sufficient to throw the invader behind the 38th parallel and that the conflict could be kept limited. At stages IV, V, and VI steps are taken to enhance UN support, to gain assurances from the Soviet Union, to define the American intervention as a "police action," and to avoid direct involvement of ground troops while assigning them to rear area duties. At the same time during these stages the situation was partially redefined to extend military action beyond the 38th parallel. At stages VII and VIII the situation was partially redefined again, which led to commitment of ground forces.

The general elements persist from stages I and II and function as "givens" at succeeding choice points. However, the evolution of definitions of the situation reveals a progressive increase in the degree of requiredness, a progressive decrease in the range of alternatives, and a progressive extension of the military commitment coupled with efforts to keep the conflict limited, all accompanied by perceived changes in the objective situation.

The Sequential Flow of Information

Motivational evolution in the Korean decision cannot be understood apart from the nature, amount, and interpretation of information at each stage and at the time of each decision. One of the most significant aspects of the case is that the main features of the objective situation in Korea did not unfold all at once. The sequence of revelation about the progress of the fighting begins with a limited report Saturday night and ends more fully revealed early the following Friday morning. The limited information at stage I becomes the basis for a decision which was positive and preparatory for next steps, yet which would not reduce flexibility of choice at the next stage. On the other hand, this condition did not prevent an initial categorization of the event as an act of

aggression. Information on the worsening situation in Korea (stages VI and VII) paves the way for an extension of the military commitment later in the week.

Not much new information was available during stage II; nevertheless a consensus was reached that the invasion could not be allowed to go unchallenged. At stage III estimates of the capacity of the R.O.K. army to thwart the invaders, an overestimation, were crucial in the choice of American air and naval units as sufficient to turn the tide. During stages II, III, and IV the decision makers received evidence of congressional support; of United Nations reactions favorable to American intervention; and some confirmation (or at least no invalidation) of their assumption that the Soviet Union would probably not directly engage American forces. Notification at stage VI that only the commitment of ground troops would stop the northern onslaught shattered a previous element in the definition of the situation, namely, belief that American air and sea support would suffice. Thus subsequent information on important aspects of the internal and external setting tended to confirm or not to confirm elements in the earlier definitions of the situation.

A distinction between information about the objective situation in Korea and "personal" information brought by the decision makers to the problem or supplied to them by intelligence estimates and reports is vital. This partially explains how the decision makers could categorize the North Korean attack in terms of past experience despite the paucity and fragmentary nature of the information that was available during the first two days of battle. For them, the violation of a frontier by organized military forces was clearly another example of the aggressions of the 1930's. To them, also, the "lesson of history" was unmistakable: unchecked aggression eventually leads to world war. The immediate evaluation of the role of the Soviet Union in the affair was also made possible by knowledge not gained from reports on happenings in Korea itself.

CHARACTERISTICS OF THE DECISION-MAKING PROCESS IN THIS CASE

We began by talking about two kinds of decision-making process analysis: organizational and intellectual. The two are related

because the former (1) determines whose calculations and discussions will be authoritative and (2) provides ingredients for the intellectual process through intelligence and other functions. Intellectual process results in the definition of the situation.

Organizational Process

For reasons previously noted, the organizational process in this case is relatively uncomplicated and manifests some important features. The first decisional unit (Saturday)—Ambassador Philip C. Jessup; Assistant Secretary of State for Far Eastern Affairs, Dean Rusk; Assistant Secretary for United Nations Affairs, John Hickerson; Deputy Undersecretary H. Freeman Matthews; and Secretary of the Army Frank Pace—was largely accidental in the sense that the President, the Secretary of State, and Counselor George Kennan were all absent from Washington. On the other hand, the five officials who constituted the unit had organizational roles which rendered them eligible for handling the situation on Saturday night. Naturally their recommendations had to be accepted by Secretary Acheson and validated by President Truman. The decisional unit for Sunday and Monday was larger and included the President, Secretary Acheson, Secretary Johnson, the chairman and individual members of the Joint Chiefs of Staff, and the civilian secretaries of the armed services.

In addition to the accidental nature of the first unit, it is important to observe that the major decisions throughout the week were made by *ad hoc* decisional units and not permanent units. Thus the National Security Council does not loom large in the process regardless of the fact that it might be considered a natural agency. Nor was a permanent group in the State Department involved. Relationships among decision makers during the week were mostly informal, and communication was predominantly oral and face to face. This suggests that a multidimensional crisis decision which requires top-level authority necessitates the formation of a key group which can escape organizational formality and normal procedures. The pressure of the situation results in the "invention" of a special decisional unit. As shown above, the decision makers acted with remarkable speed.

This relatively informal, high-level organizational process minimized the problem of co-ordination among roles and agencies. No

involved processes of clearance and compromise were necessary. President Truman's leadership, viewed as an independent organizational variable, determined the membership of decisional units (except the first one) and the allocation of power and responsibility within the decision-making group.

The Intellectual Process

In general, and abstracting from a multitude of behaviors, the deliberations of the men who decided the American response to the Korean crisis appear to confirm a basic model derived from our conceptual scheme. Given identified, authoritative decision makers, an organizational system, and a communication network (internal and external), decision-making consists in the combining of values + attitudes + information + perception + situation into the choice of a course of action. Another formulation is: a decision results from the interrelating of values and situation with attitudes, perception, and information serving a two-way mediating function. In this process values are clarified; the question of what values are threatened by an event or events is raised and answered. Value relevancy is established by a "reading" of the situation and by calculation of the consequences for particular values of a certain state of affairs. The protection of values depends upon the specification of a concrete objective and a strategy for achieving the objective.

An observer cannot predict decision-making behavior on the basis of knowledge of the actor's values alone. Values have to be operationalized in terms of the situation confronting the actor, which means that objective properties of the situation (information) and the relevancies surrounding it (perception) must be determined. Generalized values such as national security must be converted into more specific objectives, which, when achieved, will constitute a state of affairs deemed to express or serve these values. The determination of concrete objectives, of course, includes some calculation of multiple probable outcomes of single courses of action. No matter how strongly a value is held, it seems highly unlikely that a course of action having no probable outcome which would serve that value will be chosen. In the assessment and weighting of outcomes, we have a combination of a

factual and a value judgment and it is this combination which makes prediction based on the basis of value alone impossible.

However this may be, the Korean decision is pre-eminently a value decision. The strength of the value component—really a set of five basic general values[14]—overrode uncertainties. To a certain extent all public policy decisions involve risk or uncertainty, i.e., outcomes are more or less probable. Such a high degree of decisiveness was attributed to the situation that a course of action was chosen which implied a risk of all-out war and incalculable costs. In effect, the decision makers felt that the values to be served by intervening militarily outweighed any potential costs. It was, to put it another way, a blank-check decision.

Two very important qualifications must be noted. First, the attribution of a high degree of decisiveness is a necessary precondition for a decision in which the value component overrides cost. That is, the categorization of the objective event (actual situation in Korea plus its classification as a member of a class of similar events) preceded the specification of relevant values and the value-cost relationship. Second, the calculation of outcomes included a factual judgment concerning the chances of all-out war; i.e., they were improbable.

Another characteristic of the intellectual process embodied in the decision bears on our earlier distinction between value complementarity and value compromise. The former we defined as the key element in an integrated decision. Although the shared elements in the definition of the situation included agreement on the basic general values involved, there were different assessments of the relative importance of these among the decision makers. These different assessments did not alter the definition of the situation, however, because (a) the values were not incompatible and (b) the values actually were mutually reinforcing because of recognized links between them, e.g., the United Nations was at once an end or goal value and an instrumental value vis-à-vis the post-war collective security system.

[14] I.e., (1) avoidance of World War III; (2) preservation of the UN as a viable international organization; (3) maintenance of the collective security system which had been built up since 1945; (4) protection of American prestige and leadership and the confidence of friends and allies; and (5) enhancement of American military security in the Far East.

Models of the analysis of decision making usually postulate choice among two or more alternatives, and the intellectual process is viewed, in part, as the construction of a set of alternatives, which are then examined in terms of value implications and outcomes. In our analysis we have taken an observer's liberty to specify a set of alternative goal and instrumental values at each of the eight stages of the decision-making process. We have done so as a means of locating the alternative course of action chosen by the decision makers and of logically extending the implications of "if this course of action, then not that course of action." Recognizing frankly that this is an analytic fabrication on the part of the observer, we have attempted a *verstehen* type of operation guided by what a "reasonable" decision maker might see as alternatives and by asking the decision makers if such and such alternatives might have been considered regardless of whether they were.

Empirically, however, the decision-making process in the Korean case was not characterized by the consideration of multiple alternatives at each stage.[15] Rather a single proposed course of action emerged from the definition of the situation and then was subject to critical scrutiny—not in comparison with other alternatives (except inferentially) but in the context of values, outcomes, costs, and so on. For example, at stage III no alternatives to Secretary Acheson's set of proposals (among which was military intervention) at the Monday night Blair House meeting were offered or discussed. Perhaps the hypothesis would be: when the decision-making process must be compressed into a short time period and the situation is a crisis thrust upon the decision makers from outside, single alternatives rather than multiple alternatives will be considered. If this holds true, it suggests a different dialectic from that which is usually assumed. The hypothesis also is consistent with hypothesis II listed above. One possible consequence of the single alternative process may be to put a great premium on leadership and on the adequacy of probability calculations. Another may be to provide a way of simplifying a situation to the point where action is possible, thus avoiding the complexities of estimate

[15]See William Reitzel, Morton A. Kaplan, and Constance G. Coblenz, *United States Foreign Policy 1945–1955* (Washington, 1956), pp. 259–280, for a different analysis of the alternatives in the Korean situation.

involved in discussing multiple alternatives. Of course, the single alternative phenomenon may simply reflect the constricting effects of "givens" which rule out many otherwise pertinent choices.

CONCLUSIONS: WHY A DECISION AND WHY THIS PARTICULAR DECISION?

In conclusion let us indicate the bases on which we might tentatively answer the two questions posed at the outset:

Why a decision at all?

1. Decision makers authorized to act, motivated to act, and prepared to act were present.

Why this positive response rather than some other?

1. Direct military intervention, having the specific objective of restoring the *status quo*, was commensurate with the basic values threatened.
2. The objective could probably be achieved by a limited military commitment and without incurring total war or total national mobilization.
3. The risks and costs of this course of action were acceptable in terms of the values at stake; the consequences of the loss of South Korea were intolerable.
4. The means (air, sea, and ground units) were immediately available to implement the course of action decided upon.

Answers to the first question suggest the necessary and sufficient conditions for any decision. It is not sufficient to have a group of decision makers willing to act; one can imagine a lack of information which would preclude anything but a blind response. Nor are motivation and information sufficient; those authorized to act must be both willing and prepared. Even these conditions, though necessary, are not sufficient; in addition, the situation must be defined as requiring action.

These conditions may be regarded as necessary and sufficient for any action, but they do not predict what action. The second set of answers also implies a set of conditions. Really this amounts to saying that if the particular course of action were not deemed sufficient to achieve the objective without consequences which would subvert the basic values being served, another course would

have been chosen. The probability calculations with respect to the limited commitment of military forces and the chances of world war, plus the ready availability of military power (not being otherwise used), were crucial. Regardless of the cruciality of the values threatened, another course of action might have been chosen if assessments of these factors had been different. We have established to our satisfaction that the decision makers did not feel they lacked discretion despite the seriousness of the situation. Within this range of discretion, the formulation of the particular strategy adopted depended on the determinants identified and analyzed throughout this paper.

Charles Kadushin

Individual Decisions to Undertake Psychotherapy

One hundred and ten clients of a psychiatric clinic were interviewed to discover why they had decided to undertake psychotherapy. To study this depth decision an accounting-scheme technique was used consisting of five stages, the first of which, recognition of an emotional problem, was the focus of the study. Four typical ways of discovering that one had a problem were found: being told by others, experiencing painful physical symptoms, being unhappily married, and simply feeling diffused unhappiness. These types were found to differ with regard to their definition of the problem, their use of mass media, and their response to treatment. Those who recognized their problem through introspection and could change their self-image from that of a normal to a disturbed person had the best chance of being accepted by the clinic and of continuing their treatment.[1]

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THIS is a study of how some 110 persons made a very important decision. They decided that their mode of living was inadequate and that they had neither the resources nor the ability to correct

[1]The author expresses deep appreciation for the co-operation granted him by the Religio-Psychiatric Clinic's professional and clerical staff and by the most important members of a clinic—the clients themselves. Drs. David L. Sills and Samuel Z. Klausner of the Bureau of Applied Social Research, Columbia University, contributed materially through guidance and helpful criticism.

the pattern of their lives without some outside help. They decided to undergo psychotherapy. There are several stages in such an important decision. First one must feel that a serious problem exists; then one must decide how to cope with it. If the decision is in favor of seeing a psychiatrist, a particular therapist must be chosen. Since the decision to undertake psychotherapy is complex, only limited aspects of the decision can be discussed in a short article. We shall concentrate, therefore, on the way one "decides" he has a problem.

The realization that he has a problem is probably one of the most difficult conclusions for an individual to come to. Crucial in the process of administrative decision making as well is the sheer discovery of problems. In fact, if there are no problems, there is no need for administrative decision. The good executive, therefore, is the man who can spot problems before they intrude on operating efficiency. He knows, for example, that he has labor trouble before a strike actually breaks out. Only when problems are anticipated can decision making about possible alternatives take place.

Since the executive does not face the task of locating problems unaided, his job is far easier than that of the individual with emotional problems. Various schemes for accounting for the flow of money, goods, and services serve the executive as silent monitors of potential or actual trouble spots. The individual, however, has few meters and gauges by which he can mark a state of well-being or of crisis. To be sure, he is not entirely without mechanical devices. The fever thermometer, for example, is a stand-by of American middle-class families. The constant public dissemination of the danger signs of diseases such as cancer and tuberculosis, however, indicates that experts feel that people are ill equipped to measure the state of their personal physical health. Mental illness is far more difficult to measure than physical illness. Our central theme is, therefore, how people recognize that they have an emotional problem and the consequences of various patterns of this recognition.

After a brief description of the setting in which the research took place, we shall report on recent developments in techniques for the study of decisions. When the methodological and theoretical groundwork is laid, some special characteristics of the decision to

undergo psychotherapy will be discussed, and a specific scheme of analysis will be presented. Four paths leading to the decision that one has a problem will then be outlined; this will be followed by an analysis of the role of mass media and of personal influence in shaping the decision. The four types of decisions will be shown to have characteristically different attributes which affect the probability that the clinic will accept the clients. Finally, a summary will relate individual decision making to organizational structure.

THE SETTING

The sponsor for this research was the American Foundation of Religion and Psychiatry, headed by the Rev. Norman Vincent Peale and Smiley Blanton, M.D., psychiatrist. The psychiatric clinic operated by the Foundation is appropriately called the Religio-psychiatric Clinic.[2] Clients were interviewed on the clinic premises before their first session with an intake interviewer. About one-third of the sample was interviewed after the intake interview to provide a check on the effect of the interview itself. While a strictly random sample of clients was not obtained, examination of the characteristics of those actually interviewed left no reason to assume that they were not representative of the larger population of the clinic. We therefore hope to be able to indicate that the manner in which the individual decides that a problem exists also has important organizational consequences. Since the difficulties of clinical work preclude the amassing of large samples and since the results of a comparative study of clients of other clinics which was undertaken in the fall of 1958 are not yet available, our analyses must be taken as tentative and suggestive rather than as authoritative interpretations.

The interviews designed to uncover the processes underlying the decision to undergo psychotherapy made use of techniques established to elicit information in a number of different areas of research, including consumer buying, juvenile delinquency, and voting behavior. Some immediate dilemmas presented themselves.

[2]For an analytic description of problems involved in minister-psychiatrist co-operation, see Samuel Z. Klausner, "Role Adaptation of Ministers and Psychiatrists in a Religio-psychiatric Clinic" (unpublished report of the Bureau of Applied Social Research, 1957).

Is it possible to apply techniques developed for the study of these decisions to a complex problem such as the decision to undergo psychotherapy?[3] Since foolish questions are known to yield foolish answers, this problem resolves itself into the problem of asking the right questions. Even if proper questions are asked, however, can we rely on the answers of people who are "sick"? Moreover, assuming the first two objections are met, how can we ever uncover the "real" reasons for undergoing psychotherapy without having analyzed the patient for at least a year?

A METHOD FOR STUDYING DECISIONS

These objections will be met during the course of our report, but the problem of asking the right questions constitutes a primary problem in discovering an approach to the sociological study of decisions, and so it deserves a brief discussion at the outset.

Making a decision is merely a special type of action, and in the last twenty years there has been a growing interest among sociologists in the study of action. In an attempt to build basic theory or to solve a number of empirical problems, attention has been focused on phases of daily living—buying soap, listening to the radio, going fishing, and the like. This interest has led to the development of a number of ideas about decisions and decision making. Paradigms of action outlining the types of variables that must be taken into account in the analysis of unit acts were developed by Talcott Parsons and his associates and applied to the analysis of social roles and the study of complex social institutions.[4] Theory was emphasized and few concrete acts were studied empirically.

At the same time Paul F. Lazarsfeld was studying the impact of various mass media on individual decision making. Could it be discovered just how many people were influenced by various mass media to vote in certain ways and to buy certain products? What part of the decisions was attributable to personal influence? These

[3]William J. Goode wrestles with the application of techniques of market-research-type decisions to the study of complex decisions and with the relationship of action theory to decision-making theory (unpublished manuscript).

[4]Especially in Talcott Parsons and Edward A. Shils, eds., *Toward a General Theory of Action* (Cambridge, Mass., 1951).

and other problems forced the development of methods for studying the decision-making process and a formalization of "the art of asking why."[5] To show how this was done, we shall develop an example based on a study of voting. The problem is to discover what factors lead a person to switch his vote from candidate X to candidate Y. To be sure, no team of observers can follow several thousand voters during the course of an election campaign in order to observe how votes are changed. Since human beings are able to look back, Lazarsfeld and his associates asked voters who switched their vote intention why they had done so.[6] If voters are uninstructed, however, as to the proper way to respond, some might say, "I don't like X's foreign policy." Others might reply, "I heard on the radio or TV that Y is a good man," or, "My friends said Y was O.K." Still others might say, "I used to think that the main problem facing the country was high taxes, but now I think that foreign aid and world peace are more important and Y is for foreign aid."

Each of these respondents is answering in different terms. From these replies it is impossible to know whether a change in values, the influence of the radio, or the report of friends was the major factor in a change of vote. Perhaps the man who listened to the radio was also influenced by his friends. We cannot know which factor was more important unless each respondent answers in terms of all the factors.

To meet this problem Lazarsfeld devised a special check list for use in interviewing; this he called an accounting scheme. The accounting scheme ensured that each and every respondent would give a complete set of reasons for his actions. Complete answers

[5]Much of the work of the Bureau of Applied Social Research on decision making remains unpublished. Published sources include Paul F. Lazarsfeld, "The Art of Asking Why," *National Marketing Review*, 1 (1935), 32–43 (reprinted in Daniel Katz *et al.*, *Public Opinion and Propaganda* [New York, 1954]), and The Statistical Analysis of Reasons as a Research Operation, *Sociometry*, 5 (1942), 29–47; Bernard Berelson, Paul F. Lazarsfeld, and William N. McPhee, *Voting* (Chicago, 1954), ch. xiii; Peter Rossi, *Why Families Move* (Glencoe, Ill., 1955); Paul Lazarsfeld and Morris Rosenberg, eds., *The Language of Social Research* (Glencoe, 1955), sec. v; Hans Zeisel, *Say It with Figures*, 4th ed., (New York, 1957), chs. vi and vii; Elihu Katz and Paul F. Lazarsfeld, *Personal Influence* (Glencoe, 1955), pp. 162–218; and David L. Sills, *The Volunteers* (Glencoe, 1957).

[6]Hazel Gaudet, "A Model for Assessing Changes in Voting Intention," in Lazarsfeld and Rosenberg, *op. cit.*, pp. 428–438.

are those which are theoretically meaningful. Hence an accounting scheme is essentially a miniature theory that specifies the variables which must be taken into account in the analysis of any decision.

An examination of many of the accounting schemes developed by Lazarsfeld and his associates (see note 5) shows a startling similarity between the categories developed for the empirical study of action and Parsons' more general paradigms of action. Since each of Lazarsfeld's accounting schemes was tailored for a specific study, any one accounting scheme may omit one or more of Parsons' general categories as irrelevant to a particular problem. Both Parsons and Lazarsfeld are concerned that the situation in which the actor finds himself be taken into account. The way the actor actually handles the situation, or his orientation to the situation, may be subdivided into the actor's values or standards ("foreign aid and world peace are important") and his motivational orientation. Among the actor's motivational orientations are his cognitions, the perceived attributes of the situation. These are always found together with the emotional energy or cathexis invested in the perceptions ("I don't like X's foreign policy."). Evaluation, or the actor's judgement of relevant alternatives (X or Y for president), is also agreed upon by both Lazarsfeld and Parsons to be essential to the study of action. The relationship of the actor to other actors or to their surrogates is agreed to be the basis of human action ("friends said he was O.K."; "the radio said he was a good man"). Lazarsfeld, however, tends to emphasize the factor of time more than Parsons does, for when one is assessing the differential impact of various media the time ordering of these influences may indeed be crucial. All the foregoing elements must be present in any scheme that proposes to study an action or a decision completely. Moreover, all these elements must be clearly specified in advance and tailored to the needs of the problem at hand. When each of these factors is included in an answer, the response is complete.

After the collection of a complete set of reasons, each interview protocol must be assessed to determine the main causes of the action. Which causes are investigated, however, depends on the theoretical and practical interests of the research. In studies of vote switching, for example, the effect of a TV or radio talk might be investigated. Assessment of the role of the talk in switching votes

would take the form of discovering which persons would not have switched their votes without the influence of that talk.[7]

There is no sociological monopoly on accounting schemes or on theories of action, however, in the same way that there are no "real" reasons. Although the same broad accounting scheme and paradigm of action can serve the needs of both sociological and psychological inquiries, the specific categories which are included under the paradigm of action differ from one discipline to the other. The analyst, for example, is interested in an accounting scheme which ensures that his patient will relate material relevant to the basic formation of personality. Depth feelings and motivations are his real reasons. The sociologist, however, is concerned with matters which lie on the more conscious level and pertain to social and cultural images, perceptions and values. Real reasons are those which reflect social influences or cultural ideas. Hence it is meaningless for the psychologist to berate the sociologist for not taking account of the real motivations and falling into the trap of a serious discussion of rationalizations. In the same way, however, it is unfair for the sociologist to assume that psychologists will gather material bearing on cultural differences between personality types or on the role of a person's position in social structure in shaping his personality. This, then, is a possible answer to the problem of searching for "real" reasons. A real reason is simply a theoretically relevant reason. A complete answer is one which includes information on all the theoretical categories that interest the investigator.

REASON ANALYSIS AND DEPTH DECISIONS

We have been concentrating on paradigms for the analysis of relatively simple decisions such as voting in an election or buying soap. Reason analysis and accounting schemes have also been applied to decisions such as marriage, choice of a career, or a decision to undergo psychotherapy. This is not to say that buying soap and buying psychotherapy are the same sort of thing. On the

[7]This process of assessment is to be sharply distinguished from a statistical ascertainment of cause which follows the experimental model. For a full discussion of this point see Lazarsfeld in *Sociometry*, 5 (1942), 29–47. A clear picture of all the steps in the analysis of reasons is found in Zeisel, *op. cit.*

contrary, one is a casual decision and the other is a decision in depth. This section will analyze some of the differences between casual decisions and depth decisions.[8]

Although casual decisions are repetitive and therefore more easily studied than depth decisions which seldom occur, the main difficulty in the analysis of depth decisions is that they are not a unitary process but are composed of a number of steps or stages.[9] We shall therefore first analyze the implications of the stages for the construction of accounting schemes and show that people anticipate in one stage what is to happen in the next. A second problem is that depth decisions affect the individual personality far more than do casual decisions; we shall show how people change in the course of their decision to undergo psychotherapy.

1. *Stages in the Decision to Undertake Psychotherapy*

Depth decisions usually have a long history and are composed of several smaller decisions. For heuristic purposes it is convenient to think of the decision to undergo psychotherapy as composed of at least five steps. First a person must decide that he has a problem and that it is an emotional problem. Then he must decide whether or not to involve his immediate social environment, that is, whether to discuss the problem with his relatives and friends. At some point he may decide that his present efforts in dealing with the problem are inadequate and that professional help must be called in.

The future patient must further choose an institutional sphere or profession which can appropriately help a person with emotional problems. This is not as simple as it seems. As a first resort, many people turn to medical doctors not specially trained in psychiatry. Still others go to faith healers, the church, lawyers, chiropractors, and even practitioners of occult arts. Confidence-building courses and public-speaking classes are also given a trial.[10] Only a fraction of the mentally distressed seek professional aid at all, and

[8]Goode, *op. cit.*, analyzes a large number of differences between what are here called casual and depth decisions.

[9]Mary Jean Huntington in an unpublished paper has developed the idea that decisions take place in a number of stages.

[10]Not one of these possibilities was invented *ad hoc*. All were mentioned as previous sources of aid by at least one person among our 110 cases.

of these a minority are patients of psychiatrists; still fewer are given a full psychoanalysis.[11] In addition to private psychiatrists, there are mental hospitals and various outpatient clinics. Hospitals, however, are not a likely possibility for the population we are studying since these people submit voluntarily to psychotherapy. Furthermore, psychiatrists are not the only ones who give psychotherapy. Psychologists, psychiatric social workers, and specially trained ministers also treat the mentally ill.

As a final step in the process of decision, after an appropriate institutional sphere is selected, a particular practitioner must be chosen. This may be a vexing problem indeed since professionals do not advertise and the layman's ability to judge professionals is severely limited.[12]

Most persons who have visited more than one type of professional have gone through the last two stages each time they switched types of therapists. The person who starts by having a physical problem goes to doctors, receives no help, and decides that his problem is mental and not physical, often going through all five stages at least twice. On the other hand, some may omit one or more of the stages; even the first stage may be omitted. To consult a psychotherapist one need not have formulated a problem.

Since in a complex depth decision some stages in the decision may be omitted, gone through several times, or even reversed in order, separate accounting schemes must be specifically tailored for each of the five stages. The influence of mass media, for example, turned out to be much less crucial at the stage of realization of a problem than at the stage of choosing a relevant institutional sphere. "When did you hear about your problem?" is a silly question, but "When did you hear about the Riligio-Psychiatric Clinic?" is a reasonable query.

Later stages in the decision process may have an anticipatory effect on earlier stages. For example, one may feel that one does not have an emotional problem because having an emotional problem might lead to seeing a psychiatrist. A clear statement of the antici-

[11]See August B. Hollingshead and Frederick C. Redlich, *Social Class and Mental Illness* (New York, 1958), p. 257.

[12]See William J. Goode and Mary Jean Huntington, "Client Choice of Professionals," a chapter in a forthcoming book on the professions.

patory effect of the decision to go to a psychiatrist was voiced by a distraught young mother. "My sister-in-law's telling me to go to a psychiatrist made me very resentful. It's hard for me to admit that I am emotionally ill." This anticipatory effect is not found to such a great extent in casual decisions.

2. *Effect of Depth Decisions on a Person's Self-image*

Every depth decision has important consequences for the individual involved, whereas casual decisions do not. Even voting for president, which may have global implications, seems to voters to be of little personal import.[13] Depth decisions call for a more detailed analysis of the personality and history of the subject. This is obvious. What is less apparent is the fact that depth decisions have profound effects on the personality of the decider. During the course of a decision some vital personality characteristics of the decider may change. For example, each person has some idea of what he is like. This is his self-image.[14] In most casual decisions we simply decide in accordance with our self-image. To oversimplify, if we think of ourselves as Republicans we are more likely to vote for Eisenhower than if we consider ourselves Democrats. Deciding to undergo psychotherapy, however, was very difficult for our young mother because it forced her to change her self-image. She used to think of herself as a normal person; deciding to see a psychiatrist meant that she had to think of herself as an inadequate person. Somewhere in the depth decision process, at one or more of the stages, a person alters his self-image, and the entire logic and procedure of his life begins to change. What held true at an earlier stage simply no longer makes sense.

Such a change in self-image is most marked among people who start out by seeking medical aid for physical problems and then decide to try psychotherapy for their emotional ills. A white-collar worker in his middle thirties who had some college training is

[13]Berelson *et al., op. cit.*, ch. ii; Angus Campbell, Gerald Gurin, and Warren E. Miller, *The Voter Decides* (Evanston, 1954), ch. iii.

[14]For an exposition of the basic ideas of self-image see C. H. Cooley, *Human Nature and the Social Order* (Glencoe, 1956), ch. v. A modern psychological point of view is found in P. Lecky, *Self-Consistency: A Theory of Personality* (New York, 1945). A modern sociological use of self-image is in Hans Zetterberg, Compliant Actions, *Acta Sociologica*, 2 (1957), 179–201.

typical. He said, "I worry a lot about myself and my health. . . . It was mainly ever since I can remember and it's gotten worse in the last few years." He had quite a history of running to doctors. He had recently been treated for an ulcer but said, "I still don't feel good in my stomach, although the doctor says the ulcer is healed." About eight months ago he realized that "if I'm comfortable or happy I feel better. That's one of the things that convinced me that it's something inside of me that's tormenting." It was still hard for him to give up the idea that there was something physically wrong with him. As late as a few months before the interview the man had been hospitalized for an ulcer, but he began to fear that he had cancer as well. "Now this just went on. In high school and college I studied some psychology and was interested in it. I was confused; I didn't know where I was going. I felt that I needed outside help." Still avoiding a full definition of himself as mentally ill he counseled with a minister, "but I thought that if I went back I would gain nothing except some short relief." The minister did help the man to air his problems, for when he was in the hospital and finally convinced his doctor that he needed a psychiatrist (was this "argument" with the doctor a projection of his own inner argument?) he reported that his difficulties were purely psychological. When asked what he had thought the psychiatrist might be able to do for him, he said:

I wasn't sure. I couldn't seem to solve my problems or get thinking straight. I don't know what was wrong with me. Maybe he could tell me. When I went to the minister one thing was foremost in my feelings. It just kept repeating itself. It was this: "bent on self destruction."

After two short and abortive experiences with psychiatrists the man was almost eager to enter the clinic. Some hesitancy remained, however. Our final exchange was as follows:

Q. Would you tell people in general that you came here? [He said he would tell his wife.]

A. . . . I wouldn't tell people in general. I know that there's still a stigma attached to people who seek psychiatric aid, and then I guess I'm ashamed that I couldn't manage my own problem.

As time went on his self-image as a man who had emotional problems and needed outside help became more firm. His first two

attempts at therapy failed because he had not yet felt the effect of his decision. By the time he arrived at the clinic (all this took place within a few months), his self-image had almost completely changed. He was diagnosed as "emotionally immature," that is, as a neurotic, and had nine sessions with a clinic psychiatrist before he arranged to have more intensive therapy on a private basis. Apparently, in order to stay under therapy a person must have an appropriate self-image.

Changes in personality during the decision process create problems in the construction of accounting schemes. Although adequate accounting schemes can ensure complete replies, it is very difficult to rely on total recall when we are asking a person to describe values and feelings that he no longer holds. Yet this is an inevitable problem in depth decisions. If, however, we know in advance the difficulties involved in an attempt to reveal the early stages in the decision process, we will invent questions that the respondent can answer and that we will then be able to interpret, although with perhaps less precision than we would like. After all, we were able to follow some changes in self-image in the case above.

In summary, an understanding of why people undergo psychotherapy can be achieved only if different accounting schemes are constructed for each stage. Our chief concern in this paper is with the first stage—the recognition and development of a problem. As was indicated, the decision that one has a problem is associated with a change in one's self-image. This may be a slow and uncertain process, many nuances of which are hidden from the view of both patient and interviewer. In a very real sense the realization that one has a problem is not a decision or an action but a slow growth in self-awareness. An accounting scheme covering such a diffuse process can seize only on certain peaks of awareness which tie the person to his environment. No complete assessment of the various causes of a problem is possible under these conditions, although such an assessment may be possible for later stages. Rather, an attempt will be made here to develop a scheme which allows for the classification of people into broad patterns of development of problems. These patterns will be seen to interact in different ways with future stages in the decision to undergo psychotherapy.

AN ACCOUNTING SCHEME FOR WHY PEOPLE HAVE PROBLEMS

In this section we shall define what we mean by an emotional problem. We shall then examine the situation, cognition of attributes, evaluation, values, and social interaction and fit them with concrete categories which can explain, for our purposes, the genesis of a problem. Emile Durkheim wrote in his *Rules of Sociological Method* that "the subject matter of every sociological study should comprise a group of phenomena defined in advance by certain common external characteristics, and all phenomena so defined should be included within this group."[15] What do we mean by a "problem"? There are all kinds, varieties, and sizes of emotional problems. A person may be upset over his inability to get tickets to the most popular musical on Broadway. Should this be included as a problem under our definition? Under most circumstances such discomfort is considered minor and not worthy of serious attention. Yet the gradation between the trivial and the important is often imperceptible. A thirty-one-year-old woman, a high-school graduate, had the following problem:

> I would say that for approximately two years my husband and I haven't been getting along well. We have no children. Since his marriage he's been ill. . . . I wanted to have children and he doesn't. He had an ulcer created by a psychological condition. He had psychological treatment, but we didn't have enough money. We always discuss money problems.

Now here are a set of symptoms that may indicate severe personal trouble. She continued, however: "He objects to my going bowling with the girls." This last reason was offered almost as a summary of her problems. In and of itself the inability to go bowling may be even less serious than obtaining the right theater tickets. In this context, however, the problem over bowling may be both symptomatic and symbolic and serve as a focus for a set of seemingly unrelated problems.

Allowing the subject matter to define what is meant by a problem, therefore, is obviously incorrect. Instead the definition must be in accord with the client's own orientation to the problem.

[15] Chicago, 1938, p. 35.

Problems which are severe and therefore worthy of analytic attention are problems which patients mention as causing their appearance at the clinic.

There are various ways of classifying problems, once we agree to take at their face value the ones offered by the clients. In fact an accounting scheme offers a multidimensional classification of problems. The first factor to be taken into account (in line with the accounting schemes discussed above) is the situation. Often there is little that can be discovered about the situation in which the problem arose other than the client's own description of it. In that case, however, we are dealing with his orientation to the situation. For this reason, in order to include contextual material in their analysis sociologists often rely on background data—the familiar facts of age, sex, occupation, place of birth, religion, and the like. This material may be inadequate, but it is far from useless. In addition, however, this study has two other pieces of data which are independent of the client's orientation: previous sources of help and therapy mentioned by the client.

Perhaps a key to an accounting scheme dealing with problems is the dimension dealing with cognitions of the attributes of problems. In most investigations in which accounting schemes have been used, the attributes of the object concerned were attributes of some external thing, usually a physical object such as soap, cars, and the like. In this study the object is the person's problem. In short he is his own object, which explains why we were so concerned with self-images. It takes at least two steps to move from social images of automobiles to one's own self-image. In one swift thought, however, a characterization of our problem becomes a characterization of ourselves.

An important attribute of a problem is the length of time it has existed. Psychologists believe that all serious problems of an emotional nature probably have their origins in childhood; yet subjective feelings as to the length of time the problem has been troublesome indicate an orientation to methods of solution. In general our subjects felt that short-term problems were more easily solved than long-term problems, which are by nature much more serious. To avoid a built-in correlation between age and the length of time a problem has existed, a person in his early twenties was

counted as having a long-term problem if he reported that it originated in his teens.

The method and idiom of the description of a problem are also a key aspect of its attributes. An attractive thirty-one-year-old woman who works in the entertainment industry said about her problem, "I think it's a neurosis of being jealous and overpossessive." She was speaking in a psychological idiom. Any description of a problem that would make immediate psychological sense (even if not put in exactly the right terms) was classified as using a psychological idiom. For example, an elderly woman, a high-school graduate said:

> I just feel that I can't get along the way I am now. My relationships with people are very unsatisfactory. I'd rather be dead than alive. I've thought constantly of committing suicide—I thought that it would be relatively easy. Even when I was in the twenties I thought about it. I thought about it when I was fourteen. I thought of jumping out of the window.

This woman needed no psychological idiom to tell us she was depressed.

Only sixteen people, a surprisingly small number considering the connection of the clinic with formal religion, expressed themselves in a religious or moral idiom. Moreover, of these sixteen, nine also used a psychological idiom. The following is a clear example of the use of a religious and moral idiom: "My problem is temptation. It's a constant conflict with the spirit of the world and with spiritual values..."Some people used no special idiom and simply talked in a reportorial manner. Many others mixed their idioms or fell into no clearly defined pattern.

Most important of all attributes is the method of measurement of the problem—the analogue of the fever thermometer. Some people know that they have a problem because they are in constant conflict with others. For others, the inability to work, painful physical symptoms, financial difficulties, or even "sin" acts as a storm warning. (A final attribute, whether the problem is seen as one's own fault or the blame placed elsewhere, is discussed below.)

Evaluation, another dimension in the accounting scheme, is more easily studied at later stages when people weigh the merits of different therapists or types of therapy. At the stage of recog-

nizing a problem, evaluation may consist of comparing oneself to people who are better or worse off. The comparison may be made with people who have similar problems, with people in general, or with both. Values and standards are the twins of evaluation and therefore assume greater importance at later stages.

Of special interest to the sociologist and of great importance at the stage of deciding that one has a problem is a person's interaction with his environment, particularly with the social pressures that impinge upon him. Suppose a person has a cold. He notices the attributes of the problem—coughing, sneezing, feeling tired, and the like. Still he may feel that it is not worth while bothering about, so he goes to work anyway. On the job, however, he continues to sneeze. The man working next to him says, "Gee! You have a terrible cold. Why don't you go home and take it easy for a few days." This remark is decisive, and the person replies, "You know, I think you're right." He reports sick, goes home, takes his temperature and sure enough, it is over 100 degrees. He is sick. With a reverse kind of social pressure, such as is found in the army, he might very well have continued at his job. Because of the effect of social pressures on one's awareness of a personal problem, we were especially interested in the client's report of whether or not other people had spoken to him about his problem.

Mass media are also environmental factors leading to the formulation of a problem. They often lend a person a conceptual apparatus aiding him to express what he already feels. A large majority of the persons interviewed read books, periodicals, and pamphlets in search of help for their problems.

FOUR PATHS TO A PROBLEM

We shall now classify individuals into four types, each comprising persons with problems of similar origin. Systematic application of the accounting scheme will be seen to yield persons whose problems are brought to their attention before they themselves notice the problem; those who feel they have problems because they experience physical discomfort; those who have problems because of marital conflict; and those who suffer feelings of diffuse emotional discomfort.

1. *Told by Others*

Twenty-eight persons in our sample had their problems called to their attention before they themselves were willing to admit to having difficulties. This is not to say that these individuals were previously unmindful of having emotional discomforts, but their problems were not felt to be serious enough to merit a concerted attack in search of a solution. (Remember our definition of what constitutes, for our purposes, a problem.) A young lower-middle-class mother said:

I think I have had an emotional disturbance for some time, and I finally decided to do something about it. . . . Before my marriage I had a lot of conflict between my mother and myself. . . . My mother visited us. . . about two weeks ago, and she is always complaining that I never confided in her, and why I wasn't happy at home with my husband . . . and I sort of put the blame on her. She would patch things up after each conflict, and a couple of days after her visit I got an eight page letter which told me off. She said she noticed my unnatural feelings towards my son. That I give more affection to the cat.

Q. Didn't she offer any suggestions?

A. Several years ago she said that she would take me to a psychiatrist, without my knowing it. [Her husband told her about it at the time.] Because, she said, that I didn't love my husband. Now, I didn't see it that way. But now I think I need it. I get upset very easily. . . . I'm very emotional.

Despite a number of different elements in this passage several points are germane to our purposes. First, the young woman had been diffusely aware of emotional difficulties for some time. Supporting evidence is found in the fact that three years ago she had listened to a radio program about mental health and had written away for a pamphlet which listed sources for help. She saved the pamphlet but did nothing about it. This does not mean, however, that at that time she had a concrete image of herself as one who was emotionally ill. This image of herself came only after repeated attempts by her mother to enforce it upon her. Perhaps she is most like the man who wouldn't admit that he had a cold until someone told him to do something about it. Notice, incidentally, the importance of dividing our accounting scheme into stages. The immedi-

ate pressure forcing her to the clinic is somewhat different from that which encouraged her to take notice of her problems. Most of the cases in this group are easier to classify, like that of the man who reported that his wife told him, "You're crazy." As we shall see, this group differs from the others in a number of important respects.

2. *Physical Ailments*

Moving from the dimension of social influence to that of cognitions of attributes allows us to distinguish from those cases still unclassified a group of people who knew that they had a problem because they experienced physical symptoms. The man who had an ulcer and was afraid he had cancer is typical of this group even though he later felt that his difficulties were emotional. Physical discomfort was the key to his realization that he had a problem. In all, thirty-one persons, the largest group, fall into this category.

3. *Marital Conflict*

The first two groups, those who were told by others and those with physical symptoms, are characterized in their recognition of having a problem by a sense of exteriority. Either someone else told them that something was wrong with them, or the problem was located in their bodies and not in their minds. The remaining persons can be divided into two groups, one of which is also characterized by a feeling of exteriority. In our sample there were twenty-three people who, for the most part, were simply unable to get along with their mates.[16] For example, "About a week ago I had words with my husband. He said he was going to leave and that's why I'm here."

4. *Self-realization*

There remain twenty-eight persons who were simply unhappy. No one specific or common key event had led them to discover their malaise. Instead, the realization of having a problem came as a result of an accumulation of a number of diverse mishaps. As a young student in his twenties said:

The last month has been critical. I feel that my life has been, up to date, one crisis after another, one failure after another; things I couldn't

[16]A few others in the first two groups also experienced marital conflict, but the other two causes took precedence.

cope with. Recently, certain events culminated in a breakdown. I had a full program at college, I was going out with a girl and I was working. Now, the whole structure seems to have crashed in. I've given up everything. I don't care what happens. I don't do anything at all. I've given up school, the girl and the job.

This young man, in common with almost half of this group, recognized that he had a problem by his inability to work or to do what he would like to do. That is the most frequent symptom listed for this type. In fact, none of those with marital problems reported this symptom, and the others noticed it with less frequency.

The method of classifying types of "decisions" at this stage can best be summarized in the following way: Both social pressures operating on the individual and his own perception of the attributes of the problem were considered. If social pressures were such as to inform the individual that he had a problem before he himself realized it, a type called "told by others" was first separated out. Of the remaining persons, attributes of the problem were then considered. If the problem was described as one which involved physical symptoms, a second type, "physical symptoms" was screened out. The persons remaining after this screening were again examined and the attribute of perceiving one's problem as marital was considered. All of the remaining persons who described their problem as one of "marital conflict" were thus distinguished as a third type. Finally, "self-realization" remains as a residual category which nonetheless correctly describes the persons who remained after the first three types were withdrawn. The flow chart illustrates the method.[17]

[17]This chart indicates a way of solving an important dilemma in the analysis of decisions. As mentioned above, once an accounting scheme has been outlined, the investigator must carefully assess each case to determine which of the many factors in the accounting scheme was the chief "cause" for the decision. We have stated that because of the nature of the information a client is able to impart, no complete assessment is possible at the stage of the development of a problem. Sills, *op. cit.*, ch. iii, has proposed a solution for this dilemma and we are following his method. Key factors in the accounting scheme are isolated and ranked in order of priority according to some theory of action. Implicit in the ranking of the factors above is the theory that social pressure is most likely to result in the realization that one has a problem, and that introspection is least effective. This assumption becomes more reasonable when it is noted that types one to four are arranged in a descending order of exteriority to one's self. "Told by others" is the most external to the

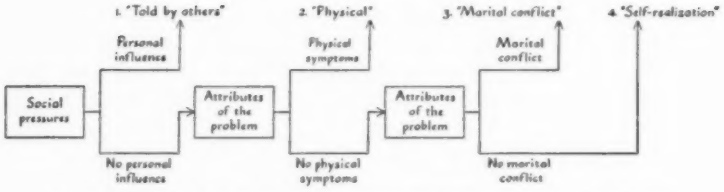

Figure 1. Method for developing a typology from an accounting scheme.

MASS MEDIA AND PERSONAL INFLUENCE

Now that four ways of developing a problem have been identified, various other aspects of the accounting scheme will be seen to cluster about these four types. First, exploring the impact of outside influences, we shall see that there are sharp differences in the extent to which the four types make use of mass media. We shall then note some difference in evaluation, i.e., in the way the four types compare themselves to others. In the next section attributes of the problem will be seen to differ from type to type.

Except for one or two individuals, the mass media were not basically instrumental in helping people to realize that they had a problem. Once they felt that something was wrong, however, they turned to outside sources for guidance and confirmation.[18] The following remark is typical:

> I recognized that I had seen about this problem before. I saw books on top of the best seller list—Dr. Peale's book. I always meant to read it, but my thinking was disconnected with my action. I finally read it about a month ago [shortly after her marital siutation became intolerable].

When people do utilize the mass media before recognition of a problem, it is usually the result of having been exposed to religious or psychological literature while in school or in the pursuit of general intellectual interests. Occasionally pre-exposure means the

personality and "self-realization" is the closest to home. After the factors are ranked, they are then separated out or cross-tabulated in order of their significance. If the factors are properly chosen, they should yield "natural" clusters; that is, the other factors in the accounting scheme should correlate highly with the classification resulting from the flow chart. There is thus no need to state *the* "cause" of a decision.

[18]A great many people in our sample had read Norman Vincent Peale's books or pamphlets. This material may have influenced them to come to the clinic, but does not appear to have been very influential at stage one.

accidental reading of a magazine in a barber shop or seeing a movie on TV, but exposure to any media dealing with mental health, other than books and pamphlets, is quite rare in our sample. Significantly, those with self-recognized problems have had somewhat more prior exposure to reading materials than any other group. In fact, next to the group with physical problems they have done the most reading (80 per cent) and in general lead all others in the number of books read on psychology. Typically their reading is in the nature of information seeking in the hope of finding psychological understanding of their problems.

The individuals who recognize their problem through physical symptoms are the most voracious readers. Almost 90 per cent did some reading. Typical comments are: "I read a lot." "Anything that's written in magazines. . . . I read a great deal hoping to find something." "Constantly. I read about it [the problem] all the time." "I've read everything I could find in the public library. . . ." Almost none read anything before they recognized their problem. They used this medium both for soothing comfort and as a means of comparing themselves with others and seemed to specialize in reading inspirational and self-help books. But the chief function of reading for them was to alter their self-image. The books speak of problems in spiritual, emotional, and psychological terms: "[the books showed] my problems are my own creation." By reiterating that such problems are "all in the mind," various inspirational books were particularly helpful in focusing the problem.

Most of those whose problems were first noticed by others did no reading. Their experience with mass media was limited to incidental exposure to movies, TV, or other media. About half of those with marital problems did read, but often the reading was not intended for themselves. For example, a woman said: "I have Dr. Peale's books. I got this for his [the husband's] birthday two years ago. But he said to my kids, 'You better take this to your mother. She needs it more.' "

The pressures exerted by others on those who have emotional problems have already been discussed in part. We found twenty-eight individuals whose problems were brought to their attention by others before they themselves felt they had a problem. About the same number of persons in each of the other types, roughly

60 per cent, reported that others spoke to them about their problems, but only after they themselves realized their difficulties. The function of calling attention to problems in these cases was to act as a "last straw," to force these persons into treatment. Entrance into treatment, however, is a different stage from the one we are now investigating. Hence there is no necessary relationship between the four types and the noticing of problems by others, after a person's own realization of trouble.

As far as can be determined at this point, comparison with others and evaluation of oneself were not effective in bringing home the realization of having a problem. This is to be expected, for one must recognize and define the problem before it can be compared to those of others. Knowledge of what other individuals did about solving their problems was useful, however, in deciding the course of action to take. In general, it seems that we are always surrounded by some people with personal troubles. We begin to understand the nature of their difficulties and really take notice of them only after we ourselves have been afflicted.

HOW INDIVIDUAL DECISION-MAKING PATTERNS AFFECT ACCEPTABILITY FOR THERAPY

A major problem in building a typology from an analysis of reasons is to show the empirical validity of the typology.[19] One must always remain somewhat suspicious of categories derived from retrospective interviews until they are shown to have predictive value. In this section we shall show that the four types are related to the way persons conceptualize their problems as a whole and that these conceptualizations influence the probability of the client's being retained for treatment. Since the selection of clients to be treated from the many who crowd clinic doors is an important matter for both the clinic and society at large, any light thrown on this process is bound to have useful implications.

1. *Ways of Thinking about a Problem*

We shall now show how persons with different types of decisions differ in their general orientation to their problems. The four

[19]See Elias Smith and Edward Suchmann, "Do People Know Why They Buy?" in Lazarsfeld and Rosenberg, *op. cit.*, pp. 404–411.

groups differ sharply in their location of the problem. Some see the problem as located outside of themselves, the "fault" lying with other people or with the environment. For others, the problem is located within themselves. About three-fourths of those who were made aware of their problems by others, as well as those with physical symptoms, felt the problem to be within themselves. Those with physical difficulties, however, were more prone to feel that the problem lay within their bodies rather than within their minds. Significantly, almost none of those who recognized their problem through marital conflict blamed themselves. Conversely, almost all of those whose problem was self-recognized felt that the problem was indeed their very own.

People with different types of problems also differed in the way they talked about them. Only three of those with marital problems spoke in psychological idiom. On the other hand, about half the people with other patterns of recognition of their problem had managed to pick up a psychiatric way of talking about themselves.

A simple explanation might be that those with marital problems had had less contact with the psychiatric profession, for it is true that over half of those who have had contact with psychiatrists or psychologists use a psychological idiom. Only a little more than one-third of those who have not seen psychotherapists speak in a psychological idiom. Thus going to a psychotherapist affects the way people talk about themselves. The incidence of previous contact with psychotherapists, however, is almost identical for the four types of problems. About one-half of each of the four types, at one time or another, visited a psychotherapist. We must therefore conclude that the nature of the perception of a problem influences the way people talk about it. This conclusion follows naturally from our previous theories about self-images. The three persons in the marital conflict group who did use a psychological idiom represent only a fourth of those with marital problems who had visited psychotherapists. Apparently those with marital problems who went to psychotherapists either learned very little or started out in the wrong frame of mind.

Strongly related to the key way of discovering a problem is the length of time a person feels that the problem has been troubling him. Over three-quarters of those with physical ailments say they

have had problems for five years or more. This finding is perfectly reasonable. To appear at a psychiatric clinic, a physically ill person must change his self-image, and this is a time-consuming process. Most had been in and out of doctors' offices for years. In fact, some 70 per cent of them had been to doctors. Five actually had tried faith healers. Less than one-third of those with other types of problems had ever visited a doctor, and only one had tried a faith healer. Moreover, only three of the physical type started treatment at the Religio-psychiatric Clinic, as compared with about 30 per cent for each of the other types. In short, these people have done a good deal of shopping around.

We have computed an "institutional shopping ratio" in the following manner. Some twelve different social institutions including lawyers, ministers, doctors, psychologists, and the like were listed. Then the number of persons in each type who mentioned having visited these sources was tallied and added up. Dividing the total number of mentions by the total number of persons in each type gave us the "institutional shopping ratio." All those except the physical type have ratios between 1.6 and 1.7, but those with physical problems were 35 per cent higher, at 2.3, showing statistically the higher rate of change in self-image that is characteristic of this type. If we were to compute an "individual patient's shopping ratio," those with physical symptoms would be far out in front of the rest. Unfortunately the "physical" group had been to so many doctors that they often could not remember exactly how many, so we shall never be able to state this ratio exactly.

Any psychologist or psychiatrist who would examine the interview protocols of those with a self-discovered problem would probably remark on the greater insight that this type displays. Part of this insight is the realization that one's problems are not newborn. Members of the "self" group, therefore, are not far behind those with physical problems in the length of time they estimate themselves to have been disturbed. About 70 per cent feel their problems have been with them for at least five years.

Only about half of those whose problems were called to their attention by others (before they themselves became aware of them) reported problems of a duration greater than five years. Two fac-

tors are probably operative here. First, by definition, this type has less insight than the others. Second, if the problem was first defined by someone not closely involved (such as school officials, doctors, and the like) the client was very likely to seek help rather soon; moreover, chances are good that he would have gone to someone in the psychological or psychiatric profession. With one or two exceptions those whose problems had been brought to their attention by someone emotionally involved with them displayed less alacrity in seeking help. Thus the more closely an adviser was associated with the image of a neutral "professional," the more likely was the ill person to take professional advice and to seek immediate help. The more quickly a person sought help, the sooner he appeared at the Religio-psychiatric Clinic. About half of the "told" types were advised by a neutral person. Thus those who had been told but a relatively short time before that they were ill reported, by and large, that their problems were of recent origin. This shows, incidentally, the importance of widespread knowledge about mental illness. If physicians, school teachers, and other persons in positions of authority can identify the mentally ill, those with problems stand a better chance of receiving early aid.

Finally, those reporting problems of the shortest duration were those who discovered their problems by finding marital life to be intolerable. This is perfectly logical. If the fault lies with someone else, as over 80 per cent of this group claimed, then it is unlikely to have had a deep or long-term psychological origin in one's own past.

In short, whatever the true psychological origin of problems, individuals who take note of their problems in different ways have entirely different perspectives as to the nature of their problems.

2. *Who Shall Be Chosen and Who Shall Be Rejected*

The purpose of building this impression of the way four types of persons discuss the attributes of their problem is to relate self-image to the institutional setting in which therapy takes place, the "situation" section of the accounting scheme. A person's orientation to his problem—that is, to himself—will be seen to make a great difference in his approach to therapy.

Some aspects of the situation have already been noted. Those

with physical problems are prone to visit doctors and faith healers. Interestingly enough ministers and the psychiatric-psychological profession are apparently considered almost equally able to help all types of problems. As noted above, roughly one-half of each of the four types had visited a psychotherapist. About one-fourth of each group had had interviews with ministers. Lawyers were seen as dealing with specialized problems, however. Six of the persons with marital problems had seen lawyers, and they are the only ones who had done so.

The future as well as the past is related to the way clients discovered their problems. Our four types of decisions are also related to the probability of the client's being retained for treatment by the clinic, as well as to the probability that clients will drop out before the fifth session (after about a month) of therapy.

Table 1. Type of decision and retention for treatment.

Retention in clinic	Type of decision			
	"Told"	"Physical"	"Conflict"	"Self"
Retained for treatment	4	9	1	12
Retained for treatment but dropped out	5 (32%)	3 (39%)	4 (22%)	3 (54%)
Other	19 (68%)	19 (61%)	18 (78%)	13 (46%)
Total	28 (100%)	31 (100%)	23 (100%)	28 (100%)

Those whose problems were self-recognized fared the best at the hands of the clinic with the "physical" group close behind. People with marital problems fared the worst, but those who first became aware of their problems through others' comments did not do much better.

The numbers above are small, yet a real pattern is indicated. Before we make the mistake of explaining what does not exist, however, we shall attempt to minimize these differences by the

introduction of further variables. Perhaps the differences are caused by degree of illness, the clinic preferring those who are less ill. There is no association, however, between retention by the clinic and psychiatric diagnosis, although there is a slight association between degree of illness and the four ways of discovering a problem. The latter association is, however, quite small.[20]

Income seems to be related to the type of decision. At first thought this may explain differences in rate of retention. About

Table 2. Type of decision and income.

	Income		
Type of decision	Less than $4,000	$4,000–9,000	Over $9,000
"Told"	23%	29%	22%
"Physical"	38	29	8
"Conflict"	9	18	48
"Self"	30	24	22
Total	100% (34)	100% (51)	100% (23)

half the clinic patients earned between $4,000 and $9,000 a year; roughly one-third earned less than $4,000, while some one-fifth earned more than $9,000 per year. Almost half of those with an income over $9,000 fell into the marital conflict type, while those with physical problems predominated in the low-income group.

Income differences cannot, however, account for differences in the rate of retention for treatment. Thirty-five per cent of those earning less than $5,000 were retained, and 37 per cent of those earning over $5,000 were retained.[21]

[20] A somewhat greater percentage of those diagnosed psychotic were either of the "noticed" or "physical" types, as might be expected according to psychological theory. Nonetheless, no differences between diagnosis and type of decision exceed 10 per cent. The differences in Table 1 are considerably larger than 10 per cent.

[21] In a study of a large clinic connected with a teaching hospital in New Haven, Leslie Schaffer and Jerome K. Myers (Psychotherapy and Social Stratification, *Psychiatry*, 17 [1954], 83–93) found that those in higher social classes stand a better chance of being retained by the clinic and of remaining in therapy once retained. Even though our methods of calculating clinic eligibility vary somewhat from theirs, our results are somewhat similar in the case of the "told" and "self" types. We used

Another social class variable, occupation, will not be considered. As Table 3 demonstrates, occupation seems definitely related to

Table 3. Type of decision and occupation.

Type of decision	Blue collar, service	White collar	Profes-sional, semi-prof.	Business, mana-gerial	None, NA, un-employed
"Told"	11	8	5	2	2
"Physical"	6	14	7	3	1
"Conflict"	4	6	5	8	0
"Self"	3	7	10	2	6
Total	24	35	27	15	9

type of decision about a problem. Because of the small number of cases in each occupational group, percentages are not given in Table 3. It is clear nevertheless that there is a characteristic type of decision for each occupational group. Blue-collar workers and those in the service occupations such as waiters, bartenders, and the like are characteristically told by others that they have a problem. White-collar workers are more prone to discover their problems through physical symptoms. Self-recognition is characteristic of professionals and semiprofessionals, whereas managers and businessmen are more likely to recognize their problem through marital conflict. Since inability to work is a typical symptom of the "self" group, the association between the lack of a job and self-recognition of a problem is to be expected.

Occupation is not related, however, to retention for treatment. Thirty-six per cent of those with "high" occupations—white-collar workers, professionals or semiprofessionals, managers, and businessmen—are retained for treatment as against 38 per cent of those with other occupations or no occupation.

income as a measure of social class, which they did not. Education, one of the factors which is in their index of social class (see Hollingshead and Redlich, *op. cit.*, App. II), is even more strongly related in our sample to retention than is income. Again, the correlation increases with the removal of those with marital problems. As will be explained below, it is possible that in Schaffer and Myers' clinic there were fewer persons who discovered their problems by noticing marital conflict.

Our final social-class variable—education—behaves in a manner opposite to that of income and occupation. There is hardly any relationship between education and the type of problem. This bears out the psychologists' conclusion that emotional understanding is not a matter of intellect but of feeling. Only when we

Table 4. Type of decision and education.

Type of decision	Education	
	High school graduate or less	Some college or more
"Told"	27%	24%
"Physical"	27	30
"Conflict"	19	22
"Self"	27	24
Total	100% (56)	100% (54)

consider the number of college graduates is there any indication that the type of problem and education are related. There were eight college graduates among the marital conflict group, seven among the "self," and only four each among the other two, but these numbers are too small to be more than suggestive. Education is, however, related to retention for treatment. Apparently education and type of decision are relatively independent factors, both of which contribute to the probability of retention for treatment.

In short, no matter what other situational factors are taken into account, the fashion in which problems are felt to originate remains a very good prognosticator of chances of retention for treatment.[22]

[22]For those interested in methodology the following is the formal logic of our rejection of alternative explanations for retention. An equation for the three attribute relationships which we are investigating is as follows: $(xy) = (xy;t^+)\ \theta\ (xy;t^-)\ \theta\ (xt)\ (ty)$. (See Patricia L. Kendall and Paul F. Lazarsfeld, "Problems of Survey Analysis," in *Continuities in Social Research, Studies in the Scope and Method of "The American Soldier,"* [Glencoe, 1950], p. 153). To check for spurious factors the normal procedure would be to examine the "partials" $(xy;t)$. If they remain relatively unaltered after the introduction of t, the assumption is that x and y are truly related. For our case, let x = type of decision; y = retention; t = a social-class variable. Were

Furthermore, once retained for treatment, those with different types of decisions have strikingly different patterns of ability to remain in treatment.

3. *Interpretation*

We shall now see why it is that the different orientations of the four types lead to different treatment by the clinic. The Religio-psychiatric Clinic, like most other clinics, has complete power of selection of candidates for psychotherapy.[23] The intake committee of the clinic, acting on the report of the intake therapist and the diagnosis of the psychiatrist, decides which patients should be treated. Decisions are made on the basis of the needs of the patient, the probability that the clinic can handle the case successfully, the available number of treatment hours, and, most important, the frankly expressed countertransference of the therapist in the intake group. Hence there must be a relationship between the therapists' notion of what constitutes a good patient[24] and the manner in which the patient has decided that he has a problem.

Perhaps the most important factor in the selection of a patient is the patient's willingness to be helped. No one can be forced into therapy. However, intellectual realization that one has a problem is not enough. Recognition of a problem must be at the level of feeling if a person is to be a good risk for the analytically oriented psychotherapy practiced in the clinic. Obviously those who were told by others that they had a problem before they themselves realized it would not meet these specifications. In fact we know that

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we to follow the above procedure we would be looking at very small numbers of cases. Instead, therefore, of working with partials, we examined (xt) and (ty) and could thus work with the full sample. In each case one of these terms was equal to zero. Hence the partials must remain. The only thing we sacrifice by this procedure is an inability to refine the discussion by specifying the relative changes introduced by the test variable.

[23]This was also the case in New Haven; see Schaffer and Myers, *op. cit.*

[24]For a fine summary of therapists' attitudes toward patients, see Schaffer and Myers, *op. cit.* In explaining the correlation between social class and retention for treatment, Schaffer and Myers draw on the assumed attitudes of different social classes to mental illness. They feel that those of higher social class might have attitudes to therapy and mental illness more in consonance with those of the therapists. Communication between members of the higher classes and psychotherapists might well be better than between the lower classes and the psychotherapists. Whereas their data consisted mainly of clinic records, we are more fortunate in possessing interview data as well.

of those chosen from this type over half dropped out before five sessions were completed. This also explains the relatively low rate of acceptance which these people encountered. Those whose problems had to be pointed out to them were further disadvantaged because they tended to claim recent origin for their problems. To the psychotherapist this is merely another indication of lack of insight.

From a therapist's point of view the most hopeless of all are the group with marital problems. As indicated, they had no internal problems; it was someone else's fault. But only someone who does not externalize his problems can be helped. Moreover, as was shown, they do not talk about their problems in the right way; very few make use of a psychological idiom. They also have the least information about emotional disturbances, if the amount of reading they have done is any criterion. Finally, their time perspective is thoroughly unacceptable to the psychotherapist.

The main reason why the physical type is so acceptable is that almost all of those accepted by the clinic have changed their self-image. They no longer regard themselves as physically ill but as emotionally disturbed. On the other hand, those in this group who are not accepted have a greater tendency to retain their original self-image. Other positive features, from the psychotherapists' point of view, are these clients' use of psychological idiom, the large amount of reading they have done, and the long-term nature of their problems.

It is now understandable why more of those who noticed their problems through introspection and the understanding of diffuse emotional symptoms were retained than of any other type; the same type also had the lowest drop-out rate. Clearly they have the right perceptions about their problem.

How does our approach relate to that employed by Schaffer and Myers?[25] First, we are not dealing with implied attitudes to psychotherapy or psychiatrists. In our scheme these belong in step four, which has not yet been analyzed. The striking thing in our study is that even the decision that there is a problem generates patterns which affect the relationship of the patient to the clinic. Moreover, in our study social class differences are not directly related to

[25] *Ibid.*

retention by the clinic, as they are in Schaffer and Myers' findings. Instead we have been able to isolate some of the intervening variables and find that social class and cultural groupings form the milieu in which certain types of decisions are more frequent. Thus only the upper class—or, typically, their wives—feel that marital problems generate difficulties that ought to be solved by psychotherapists; lower-class people simply fight. Feeling emotional difficulties in terms of physical symptoms appears to be, in our data, more characteristic of Jews and of those in a lower economic class, whereas self-discovery of emotional problems seems to characterize the professional. People of a low occupational standing or those whose parents were born in non-Anglo-Saxon countries and non-northern European climates are more likely to be forced by others into admitting that they have a problem.[26]

INDIVIDUAL AND ORGANIZATIONAL DECISION MAKING

There are several implications for the student of formal organization in this study. First is the method itself. While accounting schemes have heretofore been applied only to studies of individual decision, we believe that they can be easily adapted to the study of organizational decision. The long introduction outlining similarities between a general theory of action and methods of reason analysis was intended to demonstrate the general applicability of this type of decision-making theory. The use of accounting schemes can guarantee a complete description of an administrative decision process.

Substantively, it has been shown that even the way a decision that a problem exists is reached can have crucial implications for the final outcome of the decision. Most important, we have hinted that organizational decision and individual decision must be intermeshed processes. As Robert K. Merton has pointed out, the nonmember of an organization, the client in this case, bears

[26]At this point we can answer objections about the difficulty of interviewing sick patients. As Dr. John M. Cotton has pointed out (in a personal communication), the only way of gauging the effectiveness of an interview is through examining its internal consistency. We feel that the interviews have told a consistent story.

an important relationship to the organization.[27] Merton classifies nonmembers according to two dimensions: attitude toward membership and eligibility for membership. Those who both aspire to membership and are eligible are "candidates for membership," while those who aspire but are ineligible must remain "marginal men." The clients we interviewed are almost all aspiring members. By virtue of the type of decision they had made, however, some necessarily became marginal members of the clinic and failed to be accepted for therapy. A key organizational problem is what to do about these "marginal men." They have left the ranks of the average person who never even thinks of psychotherapy as a solution to his problems, yet they cannot join the clinic as patients. By adjusting its own decisions to the pattern of decision presented by the client, the clinic can both reduce ill will by eliminating client anxiety and increase its own operating efficiency. In sum, although organizations are traditionally studied by means of an examination of their formal and informal structure, studies of the clients of an organization may also have significant implications.

[27] *Social Theory and Social Structure* (2nd ed.; Glencoe, 1957), pp. 288–292. Herbert A. Simon, *Administrative Behavior* (2nd ed.; New York, 1957), pp. 16–18, also calls attention to customers as elements in the equilibrium of organizations.

Burton V. Dean

Application of Operations Research to Managerial Decision Making

Beyond the routine actions of the industrial executive are the decision-making or planning activities. Operations research has been successful in developing and applying scientific methods to aid decision makers. This article has a fivefold purpose: to outline the decision-making process and the role of the decision maker in this process; to indicate the utility of operations research in solving decision-making problems, to show how analytic models are constructed and solved, to note some tools and techniques for solving such models; and to forecast some possible future developments of operations research techniques and their possible effects upon decision making.

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THE decision maker's environment, information, alternatives, and objectives must be clearly stated before the researcher can hope to solve his problem successfully.

Before the decision maker can apply rational procedures, the need for a decision must be demonstrated. From the multitude of possible questions a correct one must be selected and the range of alternatives, risks, and possible outcomes stated. The relative importance of each objective must be estimated. For example, in

a firm with severe investment capital costs and opportunity restrictions, is an inventory control policy required, what stock shortages will the firm accept, and how will the firm make use of any possible funds that might be released from reduced inventory levels?

The information required in a decision-making process must be estimated as to reliability and bias and demonstrated to be pertinent for the given situation. A crucial problem is the selection of the critical measures of performance that are bench marks for the decision maker. Quantitative and relative values of each performance level must be known. A market research decision on the size and allocation of an advertising budget ought to consider product sales or market share performance, but the value of different sales levels to the company must be related to the associated profit levels.

Decision making is always performed in an environment of imperfect, fragmentary, and erroneous information. Prior to developing decision rules, the decision maker must have some estimate of the validity of the data which were used as inputs. Data requirements and sources must be evaluated, and where the decision-making process is critically dependent on certain estimates or forecasts, these must be obtained. For example, an inventory control policy is based upon estimates of cost quantities such as depreciation and shortage costs and forecasts of sales and production rates.

A decision-making process involves at least two alternatives and sometimes many thousands. The gains, risks, costs, and effects of each alternative must be estimated so that a comparison can be made of the relative advantages and disadvantages of each. It might be said that the decision-making process is concerned not so much with the selection of that alternative which is best in every respect, for none usually exists, but with that which is near the top in the more important categories, and satisfactory otherwise. Where there does not seem to be such a strategy, then either the objectives are too many or the list of possible alternatives too few. The research manager, seeking to determine the optimal size and allocation of the research budget, must consider all of the alternative ways of spending research funds.

The output of a decision-making process is a set of rules or policies. Since decision making is a human endeavor and involves

actions by people other than the decision maker himself, the decision rules should be acceptable and understood by those who are to implement them. Sufficient breadth of interpretation of the rules must be provided so that variations in operational environments do not seriously degrade the estimated performance of the system. System controls are established so that planned modification of the decision rules can occur upon changes of the system characteristics. In production planning, production yields or rates are adjusted when sales requirements vary.

In any decision-making process there should be a method for self-evaluation. Objective judgments are often reached by comparisons with historical performances, but this ought to be done only when the company and out-of-company factors are comparable. For example, inventory levels before and after policy initiation can be compared providing production difficulties in one period did not call for unusual stock piling of raw materials or finished goods.

THE ROLE OF THE DECISION MAKER

It is almost impossible to give a precise definition of the decision maker's role in an industrial organization and have it apply to all such individuals. However, certain significant factors may be noted.

Decision makers are placed at every management level of the company organization. They may be assisted by staff experts, but the ultimate responsibility for performing the decision function within the organizational unit is their responsibility. If the company is looked at as an information transmission network, decision makers act as input-output spheres of influence for this system. At high company levels decision makers have a wide area of responsibility, which, however, does not encompass their area of effect.

Except at the very highest management levels most decision makers reserve only a fraction of their effort for thinking and planning. By far the largest proportion of most executive time is spent in mechanical, routine, and repetitive actions in which the conditions for and results from decisions are generally well understood and predictable. Significant or important policies are determined periodically and are subject to later review and possible revision. Management decision making is only one activity of the

decision maker, for he is also concerned with administrative, managerial, and training functions.

Operating within an action area of the company, the decision maker has imposed upon him the restrictions that are determined by the nature of the company organization and the degree of co-operation and competition that results from this organizational structure. Considerable research has been done in the determination of effective organizational structures for companies, but as yet no practical means exists of determining how a given company should be organized so that it may accomplish its tasks optimally. Where the decision maker's objectives and constraints are undefined or loosely stated, it becomes difficult to achieve or measure good performance. But where his objectives and constraint are firmly stated, lost opportunity costs result when he makes decisions in a defensive manner.

Aspects of Sequential Decision Making

Because an action completed at a given point in time can only be changed or modified at a later time, decision makers employ planning lead times to obtain the required information for choosing an effective course of action. Decision making is scheduled so that at a decision-making time a policy (or an entire stream of decisions) is chosen and the results of this policy are estimated. At the next decision-making time the procedure is repeated. The net result of sequential decision making, often called dynamic programming, is that a decision is made only after the effect of possible subsequent courses of action is considered.

THE UTILITY OF OPERATIONS RESEARCH

Operations research has addressed itself to a multitude of company problems in which the research consumer was a decision maker. As a result, a large variety of tools, techniques, and methods have been developed which can help solve some decision questions and provide insight into others.

Operations research is the application of scientific principles to the solution of decision-making problems. Specifically it is the application of scientific methods, techniques, and tools to problems involving the operations of systems so as to provide those in control

of the operations with optimal solutions to the problems. As a result of valuable work done in World War II operations research was formalized as a science and was subsequently initiated into many industrial organizations. Today operations research groups can be found in most large companies, at a number of universities, and in private consulting groups.

Operations research attempts to solve problems where the interaction between components plays a significant role and where the best decisions are sought for the complete organization. For example, in solving a distributor inventory problem, the effect of alternative distributor inventory policies on factory inventory, production, and purchasing policies are considered.

Problems are solved sequentially, for the over-all problem cannot be formulated exactly in advance. In the above example, alternative distributor inventory policies must be considered in determining which of the factory's policies with regard to inventory, production, or purchasing is optimum. A characteristic of most operations research problems is that subproblems serve as inputs to other subproblems, so that the stream of subproblem solutions makes up the solution to the entire problem.

Although operations research is concerned with finding optimal decisions or policies, certain aspects of the system cannot be evaluated or determined within the environmental limitations of the problem. Where stock or machine shortage costs cannot be estimated, optimal production policies are determined for each value of the shortage cost parameter. Then the decision maker uses judgment as to the shortage cost value and in effect determines an optimal policy. Guides to this cost value are the historic decisions and the shortage costs that they would imply if they were optimal.

THE METHOD OF OPERATIONS RESEARCH

A systematic procedure exists for attacking problems that fall within the domain of operations research. There are extenuating circumstances when additional phases are required but, in general, there are at least six phases:

1) At the beginning of a problem there is an orientation phase which is concerned with exploring management's questions and

objectives. The problem's scope must be clearly stated, as well as those assumptions, limitations, and factors that are required to outline the framework or structure of the problem. Measures of system effectiveness and the restrictions enforced upon the system by the operating conditions are specified. Agreement on problem definitions by both the decision maker and the operations researcher is necessary if the subsequent study is to be successful. However, ultimate restatement and reformulation are not ruled out as new facts or relationships are discovered.

2) Operations research emphasizes mathematical concepts because a large body of mathematical principles and methods may be employed to find optimal decisions. In fact much of the study of several branches of mathematics is concerned with finding optimal values and characteristics of functions. The mathematical model that is constructed is one or more functions of control and uncontrollable variables, subject to restrictions on the values of the variables. For example, a production-planning model would be a cost equation where the total cost is given as a function of the control variables, production lot quantities, and setup times, and the uncontrolled quantities, production and sales rates, and holding and shortage costs. The restrictions may be trivial—for instance, the solutions may be required to be nonnegative—or real, where the solutions are limited by available warehousing space.

3) Both analytic and numerical techniques may be applied to the solution of operations research models. When analytic procedures are used, alternate results may be studied by substituting values in the derived functions and comparing the effects. Numerical procedures are used whenever analytic ones are not feasible; they yield valid results only for specified values or intervals of the variables and parameters.

4) A model is never more than a partial representation of reality. It is a good model if despite its incompleteness it can accurately predict the effect of changes in the system on the system's over-all effectiveness. The adequacy of the model can be tested by determining how well it predicts the effects of these changes. The solution can be evaluated by comparing results obtained without applying the solution with results obtained when it is used. These evalu-

ations may be performed retrospectively by the use of past data or by a trial run or pretest. Testing requires careful analysis as to what are and what are not valid data.

5) A solution derived from a model remains a solution only so long as the uncontrolled variables retain their values and the relationship between the variables in the model remains constant. The solution itself goes out of control when the value of one or more of the uncontrolled variables and/or one or more of the relationships between variables have changed significantly. The significance of the change depends on the amount by which the solution is made to deviate from the true optimum under the changed conditions and the cost of changing the solution in operation. To establish controls over the solution, then, one must develop tools for determining when significant changes occur and rules must be established for modifying the solution to take these changes into account.

6) The tested solution must be translated into a set of operating procedures capable of being understood and applied by the personnel who will be responsible for their use. Required changes in existing procedures and reserves must be specified and carried out.

The steps enumerated above are seldom if ever conducted in the order presented, and, in fact, they may take place simultaneously. In many projects, for example, the formulation of the problem is not completed until the project itself is virtually completed, and there is usually continuous interplay among these steps during research.

MODELS AND THEIR SOLUTIONS

With the growth of scientific knowledge of decision making has come the use and development of specialized mathematical tools and operations research techniques. These have made possible the scientific analysis of many decision problems as well as insight into others. This section presents the steps usually performed to construct and solve operations research models and some useful tools and techniques for reaching solutions.

Model Construction

In most applications of operations research to decision making

mathematical models are constructed, for then the entire spectrum of mathematical techniques is applicable to the problem under analysis. With a mathematical representation comes the opportunity to manipulate and study the system in great detail at minimal cost. Where optimal decisions are desired, the optimization of the mathematical functions can be carried out. Model construction is the central feature of the operations research method for it serves as the basis for reaching optimal decisions. There are at least five stages of model construction:

1) The important control variables are identified. For each control variable the alternative courses of action are enumerated and quantified. Where a control variable may have only a limited range of values, this range must be specified. For example, in a production control problem the model might incorporate either lot-size or production-time variables, where values of these variables could assume only nonnegative values restricted by system capacities.

2) The important uncontrolled variables or model parameters must also be identified. For each model parameter values must be obtained or data collection methods developed to obtain them. As a minimal objective a range of likely parameter values must be obtained. In production- and inventory-planning problems, production setup costs and inventory-holding costs or their ratios are usually required.

3) A measure of performance for the system under study is obtained and related to the controlled and uncontrolled variables in mathematical terms. Conflicting measures of effectiveness usually occur in decision-making problems, and a number of performance measures must be obtained. Thus a set of mathematical functions $[E_1, E_2, \cdots, E_n]$ that represent different objectives are derived:

$$E_1 = E_1\ (X_i, Y_j),$$
$$E_2 = E_2\ (X_i, Y_j),$$
$$\text{- - - - - - - - -}$$
$$E_n = E_n\ (X_i, Y_j),$$

where $[X_i]$ is a set of control variables and $[Y_j]$ is a set of model parameters. The derivation of these functions is the crucial step in model construction. Each E_i must represent a true management

objective, and the entire set of E_i's must encompass the range of objectives. Typical E_i are costs, sales, profits, and return on investment.

4) In addition to the model functions, a set of restrictions $[R_1, R_2, \cdots, R_m]$ are obtained. These are usually expressed as mathematical inequalities and are also given in terms of the basic variables and parameters:

$$R_1 = R_1 (X_i, Y_j),$$
$$R_2 = R_2 (X_i, Y_j),$$
$$- - - - - - - - -$$
$$R_m = R_m (X_i, Y_j).$$

Examples of the R_i are maximum warehouse space or minimum return on investment.

5) The objectives of management are stated in terms of mathematical criteria to be applied to the set of objective functions. Maximization of profits, minimization of costs, and achievement of standard cost levels are typical management objectives, and the associated mathematical criteria are the same but applied to the functional set. Thus the solution to the mathematical model will be a set of decision rules that satisfy the objective function set and the restriction set.

Model Solution

After the model has been constructed, model solution begins. In reality certain tentative solutions have been obtained in determining the important variables, parameters, and measures of performance.

1) Several mathematical tools are usually available to solve a model. Where input parameter values are subject to large inaccuracies, approximate techniques are sometimes appropriate. Where excessive computational techniques are required to implement the decision function, the degree of company computing facilities are an important factor in choosing between several techniques. Exact mathematical methods are preferable to Monte Carlo techniques, providing exact analysis is feasible. A variety of different techniques offer possibilities for model solution checks and extensions.

2) Usually the model solution is given in terms of a number of decision rules. These are found by applying suitable mathematical

techniques. Model solutions that are extraneous and are introduced as a result of the mathematical formulation are discarded.

3) The model solutions must be verified as providing solutions that are operational.

4) Certain variables have been omitted from consideration and initial assumptions made in order to construct the model. The influence of these input conditions must be verified. Additional factors would be considered if the model solutions are sensitive to the basic assumptions.

5) Since the solutions depend on the values of the system parameters and the basic model assumptions, control procedures must be developed. Thus in addition to having the solution at a given time management must be given time-dependent solutions where a dynamic model is considered. Control charts are sometimes useful in revealing important changes in the system parameters.

Mathematical Tools

Probably the most useful tool for the student of decision making is differential calculus. Since the optimum value of the measure of performance is desired, differential calculus, using the derivative operator, allows one to find the extreme value and the corresponding values of the control variables. Optimality criteria are useful in determining whether control variable values as found by equating the first derivative to zero provide extreme performance values. Such solutions can be used for further development as decision rules. Where there are model restrictions, the Lagrange Multiplier may be used: for example, if $E = E(x,y)$ is the measure of performance for a system and $R(x,y) = 0$ is a restriction on the permitted values of the x,y variables, then any extreme point of E that satisfies R will also be an extreme point of $F = E + \lambda R$, where λ is a constant of proportionality or Lagrange Multiplier. This tool is useful in solving production-inventory problems where there are serious warehouse space restrictions. Taylor series expansion of functions is useful in determining approximate functional representation, given certain properties or values of the initial derivatives.

In many operations research models the expected value of the system performance to be optimized is given as an integral. Integral

calculus provides a method for optimizing an integral function. Other uses of integral calculus for decision-making purposes include the simplification of complex model integral equations and the tabulation of integral functions.

Differential equations are a useful tool in solving waiting-line models when the differentials of the state probabilities are given in terms of the system parameters. Another application is to economic and competitive models where rates of growth or decay are functions of system parameters. Competitive or Lanchester models that are represented as systems of differential equation have been investigated in both military and industrial applications.

Numerical methods are used to solve problems when exact or analytic methods fail. Although the integral of a continuous function always exists, most integrals cannot be evaluated directly, and approximate methods such as the trapezoidal or Simpson's rule are usually satisfactory. The numerical solution of equations by methods such as Newton's permit approximate solutions whose accuracy depends on the number of successive iterations that are performed. Algebraic tools, such as matrices and determinants, are also useful in solving systems of equations. Analytic tools, such as the Laplace transformers may be used to analyze input-output models.

Operations Research Techniques

Many techniques have been developed for use by decision makers, but only a few can be described here. Mathematical programming is probably the most useful technique because it is capable of solving some allocation problems. The usual problem is to satisfy requirements, given limited resources, at minimal cost or with maximum profit. Examples of linear programming are transportation problems, when it is desirable to ship company products located at a number of factories to consumers at different destinations, and assignment problems, when a number of activities each require one resource. An example of the use of dynamic programming is its application to equipment replacement scheduling. Computational programs, once a bottleneck, now exist for solving linear, non-linear, and quadratic programming problems.

Waiting-line models are solved by means of queuing theory, in

which the probability that the system is in a given state, n, as a function of the ratio of arrival to service rates is derived from the operation of the system under study. Recent developments in queuing theory have yielded solutions to multistage problems, and Monte Carlo methods have been developed to yield numerical solutions in cases where analytic ones have not been determined.

Competitive models have been analyzed using game theory. Although the solutions that are reached by means of game theory are not usually translated into decision rules directly, the method of analysis given by game theory is a useful tool. Difficulties in estimating the effect of errors in matrix coefficients on model solutions and in accepting the assumptions that competitors have incomplete or no knowledge of the other strategies are being studied. Operational gaming has been useful in deriving optimal strategies and outcome values in complex games which have not yielded exact solutions.

In sum, the operations research techniques that are being used today include: inventory theory, linear programming, dynamic programming, allocation theory, queuing theory and stochastic processes, sequencing theory, routing theory, line balancing, replacement and maintenance theory, information theory, communication theory, search theory, game theory, and organization theory.

DIFFICULTIES IN DECISION MAKING

Although better methods have been developed to aid decision makers the complexity of their problems has also been increasing at a rapid rate. Operations research has used and developed analytic techniques that are sufficient to solve many management questions, but better techniques need to be developed. Several factors that are causing decision-making difficulties are analyzed below.

Complexity

The complexity of the functions of industrial organizations has generated a need for applying the techniques of operations research. In some areas of increasing complexity these have been successful, while in others much remains to be done. The vendors of large corporations may be numbered in the thousands, but the

control and scheduling of company purchase programs can use linear programming techniques and high-speed computer programs to effect desired economies. The products of many corporations are also numbered in the thousands, but the optimal location of distribution centers for these products can be determined by means of the transportation technique of linear programming. Production facilities have grown more complex and costly, but the economic life of manufacturing equipment can now be determined by means of replacement theory. On the other hand, while organizational structures have become more complex, operations research techniques have not yet been developed to solve detailed problems as to the optimal size and structure of a company. In general, operations research has not been completely successful in solving long-range problems, such as the optimal product mix for a company in some future period, since these are related to the interaction between design, production, and distribution components. A particularly difficult problem is determining the optimal research budget for a company whose research requirements and sales of future products cannot be easily estimated.

Errors

The cost of errors in decision making is measured by loss of profits in future periods beyond the decision-planning period. This loss can be minimized by selecting a planning period of sufficient length so that unsound initial decisions, which take into consideration subsequent decisions, do not affect the system's total performance significantly. For example, an annual production plan that uses annual sales forecasts should not be sensitive to the first month's production and sales. Sufficient plant production capacity and flexibility ought to exist in the event that demand varies from sales by 10 per cent or that a seasonal weather change occurs one month sooner or later. Company economists may be useful in predicting changes in the economic climate of the company's products and reducing the costs resulting from decision-making errors. Cost models that are used for decision-making purposes ought to include the error costs resulting from inaccurate estimates and forecasts. These error costs cannot be ignored, as the effect of overestimating and underestimating model parameters is not the

same. Furthermore, the nature of the harm resulting from very large decision-making errors might be of sufficient magnitude to cause the decision maker not to want an error of this type to occur or at least to occur very infrequently. On the other hand, lost opportunity costs result from too conservative an attitude, as for example in budget planning for research that makes no provision for basic research or new product development. Careful control procedures are always required when error costs are large.

Changing Technology

Three areas of changing technology affect the decision maker. Outside the company, competitors force market changes through the development of new products and production methods and the establishment of improved means of product distribution. In-company development programs are used to meet this competition and to give new sources for investment capital. It is in this second area of change that the decision maker or his contemporaries have the most information and greatest effect, and this is where he seeks to change the nature of his own environment to meet the out-of-company changing conditions. The third area of change is that of the sciences dealing with problems related to management where improved methods of analysis provide better means for decision making. For example, recent developments in computer programming allow almost any industrial purchasing or distribution program to be analyzed. Also recent developments in operations research methodology as it is applied to advertising permit a company to evaluate and optimize certain advertising programs. A decision maker should of course be informed of such advances and breakthroughs in the sciences related to management so that he may apply them to his company's procedures in order to meet changes taking place in its markets and competitors.

Information and Communication

Effective decision making requires reliable information, which is sometimes available only at significantly high costs. These costs must be balanced against the savings to be achieved under improved system performance. For example, an effective inventory control policy might require very reliable sales forecasts.

But if the costs of obtaining these forecasts are excessive or time-consuming, then the real cost savings are considerably reduced. A possible alternative is to derive a policy that uses less reliable sales information but which minimizes total costs, including data collection costs.

The continued growth of companies has produced longer communication lines accompanied by limited responsibility of decision makers. Specific areas for management decision making have been determined in most companies so that company components compete with one another. Marketing departments desire high inventories in order to lower costs resulting from shortages because one responsibility of the marketing manager is to minimize the number of lost sales resulting from shortages. However, a shipping department, because the shipping manager's performance is judged on the basis of the magnitude of warehousing costs, desires lower inventories which imply lower stock costs. Wherever the different company groups are not in close communication, inventory imbalances may occur. It is the function of the inventory control planners to find the inventory levels that minimize the total costs of carrying finished goods stock.

ROLE OF COMPUTERS

The development of high-speed and large-memory computers is probably the most important factor, other than operations research, in providing assistance to decision makers. Within the last ten years computer use has grown from one of routine service to one of real scientific aid. Although computer costs are high, computer returns may be even higher, and its withdrawal from company service would be a severe loss in most cases. Computers are finding applications in companies where the specific uses could not be forecast in advance of their installation. Some uses of computers and operations research in decision making are given below.

The possibilities of handling large amounts of data quickly have encouraged the development of mathematical programming techniques to solve numerous business problems. Large inventory control problems can now be handled on a current time basis because of the development, manufacture, and installation of advanced computer systems. Iterative computational programs can now be

written to solve sequential decision-making problems in such areas as oil drilling, warehouse stock piling, and investment selection where analytic solutions are impossible because of the complexity of the underlying mathematical functions.

Computers are useful in the planning of company programs. In the area of economic analysis the effect of different allocations of the budget to company activities may be investigated by means of special "games" that are designed to be played by company personnel with the aid of computers. Plant and site location and layout plans may be evaluated by means of computer programs. A computer program has been developed to analyze personnel recruitment, selection, and training plans. Computers are also used in inventory planning to record stock changes so that production runs can be initiated and to determine equipment mortality data so that effective replacement and maintenance policies can be developed.

Computers are used to determine trend and control curves so that the time and effect of changing conditions can be determined. Such programs have been developed for cost accounting, quality control, and sales analysis. In the chemical and petroleum industries computers are being used to yield finished products that satisfy specified product conditions with minimal processing costs or times.

Of recent development is the use of computers in business games to simulate the essential elements of complex industrial organizations. The military uses of computers in war games have been extended to industrial areas. The specific purposes are usually twofold—to educate and train executives in better decision making and to develop research techniques for the analysis of the organizations themselves. Monte Carlo methods have proved useful, as for example in inventory theory where incoming orders and stock flow are simulated, and optimal inventory levels can be calculated from a computer program that yields the probability of a given level of stock being on hand.

AUTOMATIC DECISION MAKING

Because of the decision-making difficulties that result from the use of human beings to carry out routine functions, computers are

being integrated into planning systems to help make decisions. The concept of automatic decision making is being developed in companies where the costs of errors are large and frequent decision making is required. However, this requires that mathematical models of the company's functions be developed and furthermore that the model be capable of being programmed for computer use. Much work remains to be done, but the expected returns from these developments are high. There are two significant requirements. First, scientifically trained decision makers are required in very large numbers, for computer programs require the development of applicable mathematical models, the development of specific machine instructions, and the collection and tabulation of the required data inputs. Secondly, electronic computers must be further developed so as to be capable of handling very complex organizational problems, and their capacities must be more fully understood so that they can be economically used.

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